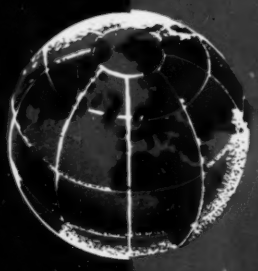
AUGUST 1959

MINING WORLD



Highlights in Mining This Month

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NEW IRON ORE PLANT produces premium product and improves Steep Rock's competitive position . . . 32

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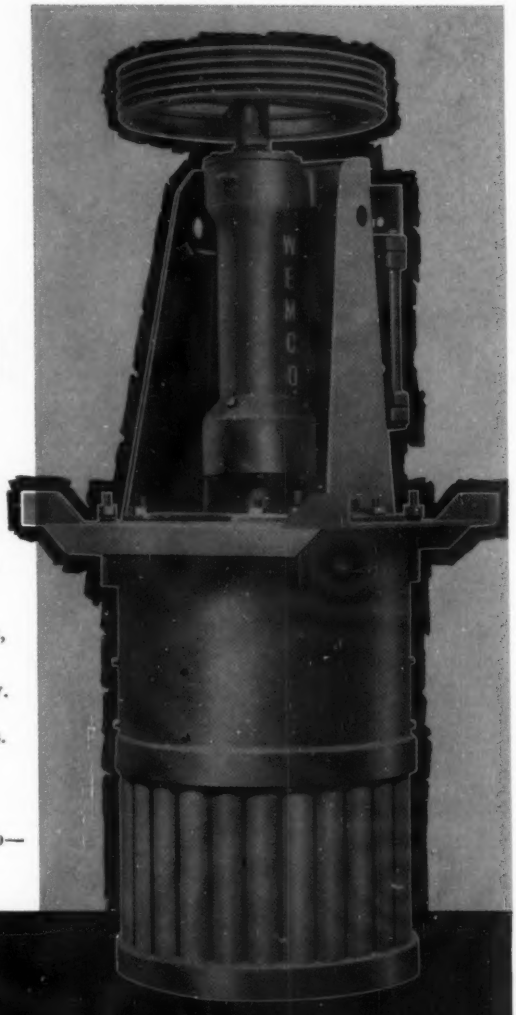
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NEW ZINC SMELTER proposed for Ontario; contracts already let for ore roasting and acid facilities 31

THIS DECISION WILL PAY BONUS PROFITS OF MORE THAN $6,500 EVERY DAY!



This order and installation of Wemco-Fagergren Flotation Machines by a leading coal producer will result in additional profits of over *$6500 per working day*— and for surprisingly low capital investment. Cost of the total plant addition, including the flotation cells, will be offset in less than four months.

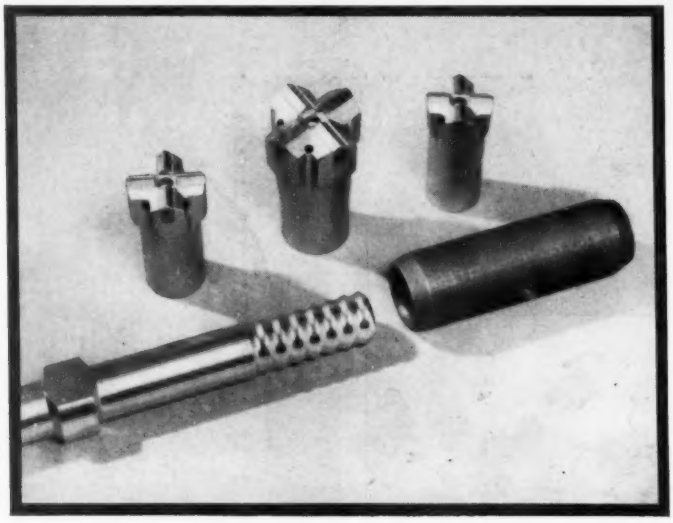
This is another example of how Fags go to work—profitably. Recovery is consistently higher; floor space, maintenance and operating labor, reagent and other requirements are less.

The Wemco-Fagergren record of profit-producing installations tells the story of sound experience. The men of Wemco will be glad to furnish all the facts and discuss why Wemco-Fagergren Flotation will do a better job—where flotation has a place.



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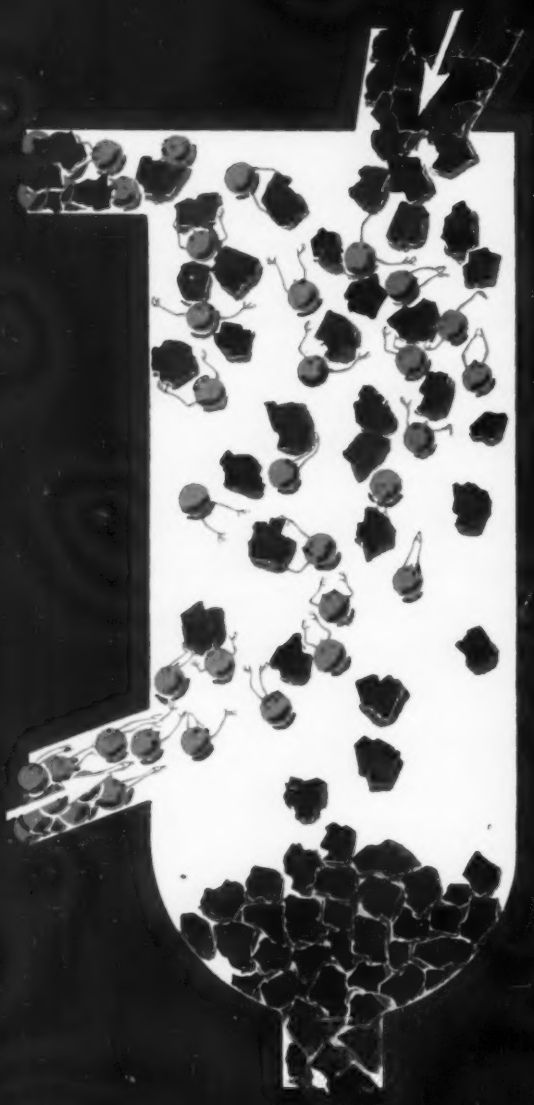
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Mining World

Including the Export Edition **WORLD MINING**

VOLUME 21 **AUGUST 1959** No. 9

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MILLER FREEMAN PUBLICATIONS

New York Times States:

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are pumped into our coal mines during every day of the year. Weight of air circulated daily through a mine has been estimated at more than six times the weight of the coal mined that day".

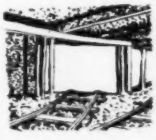
. . . but how much of it reaches the working face?

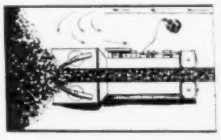
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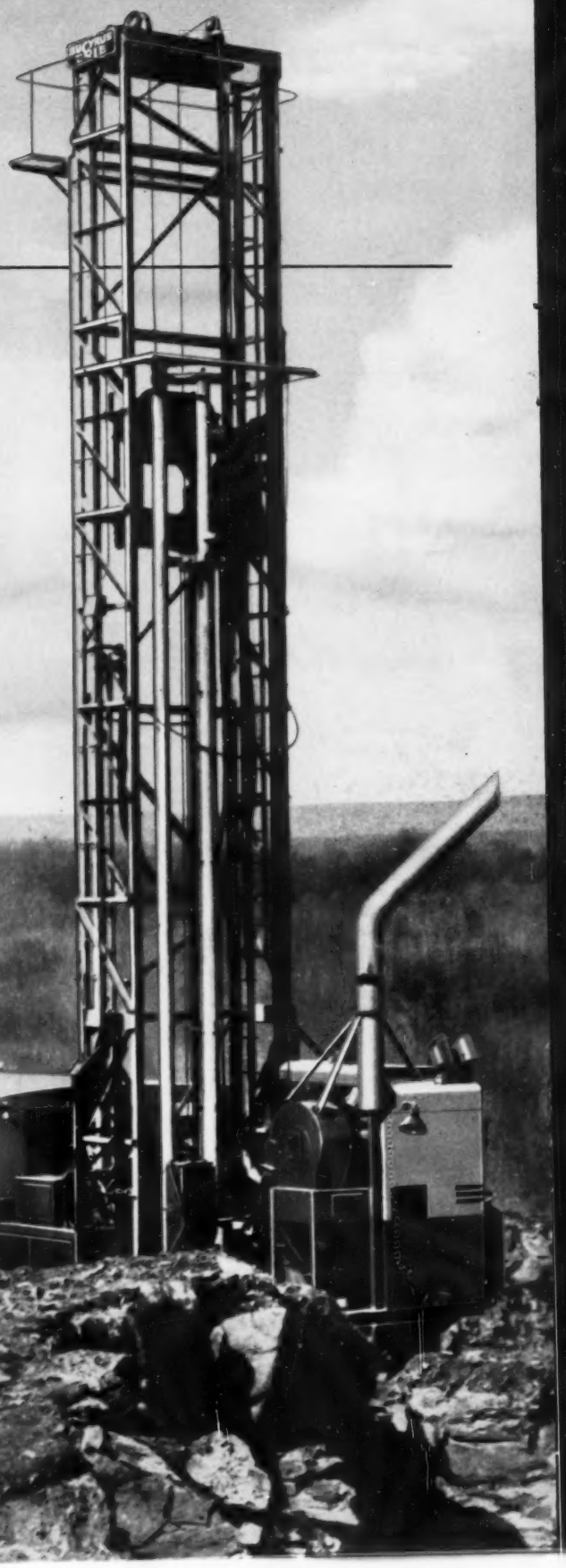
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Mining World

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500 Howard Street
San Francisco 5, California
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Published by American Trade Journals, Inc.
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L. K. Smith, Vice President
Miller Freeman, Jr., Sec.-Treas.

SUBSCRIPTION RATES:
U.S., North, South and Central America $4.00
Other Countries $5.00
Single Copies ..... $ .50
Directory Number $1.00

CHANGE OF ADDRESS:
Send subscription orders and changes of address to MINING WORLD, 500 Howard St., San Francisco 5, Calif. Include both old and new addresses and zone numbers.

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MILLER FREEMAN PUBLICATIONS

Drifts and Crosscuts

Don't Tell Me — Tell Your Neighbor .....

Mining has a future and the United States is lagging behind the Russians who are exploring every square meter of their vast land. Here in the United States there is an accelerating program to WITHDRAW large areas from any prospecting and all mining.

This is a vital danger to every citizen of the United States, yet they don't realize how mineral production and mineral know-how are needed now and of importance to the future.

So warned Dr. E. F. Cook, dean, College of Mines, University of Idaho at the convention of the Idaho Mining Association.

He pointed out the loss in mineral production from the many "single purpose WITHDRAWALS" by many different Federal government agencies. The most dangerous to safety of the nation is the Wilderness Bill which would lock minerals, undiscovered and unmined, forever in WITHDRAWN areas. Only the President could authorize their mining. Another wild life wonder wish based on ignorance and wishful thinking that all the President has to do is command and minerals would pour forth at once from WITHDRAWN areas.

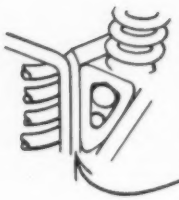
Many, in fact most, WITHDRAWN and proposed withdrawal areas are unmapped and less than superficially prospected. Mineralized areas found by long and determined prospecting should be excluded from the vast natural museum proposed by the Wilderness Bill.

The mining industry is aware of the dangers. Don't tell them—tell your non-mining friends and neighbors that you can't continue the metal civilization of today by permanently locking minerals in Military, Forest Service corrals and outhouses, and power site WITHDRAWALS.

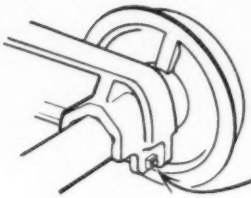
Right To The Point — Resolution 177

The House Subcommittee on Mines and Mining unanimously approved a resolution requesting the Administration to make a thorough review of its mineral policies "To provide for increased production."

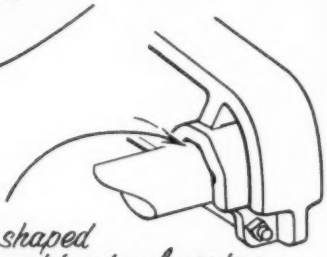
The resolution declares that maintenance and development of a sound and stable domestic mining industry is "in the national interest." It makes clear that there should be further curbs on imports of vital minerals. The subcommittee took the stand that the minerals depression has been caused by the strengthening of foreign sources of supply and the lowering of stockpile requirements.



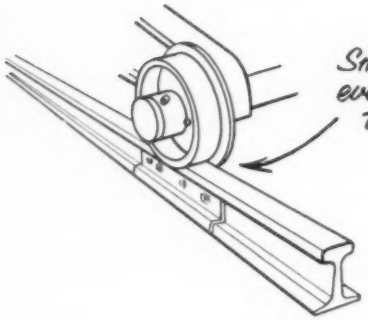
Movement between bolster and side frame is taken on specially designed wear surfaces



Quick wheel change

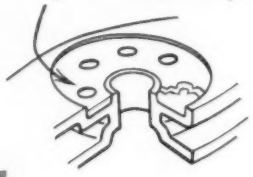


V-shaped machined axle grips for controlled flexibility and truck alignment

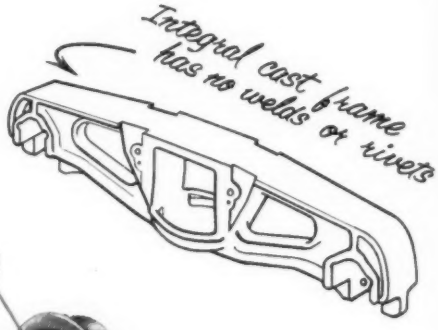


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Large center bearing for longer life



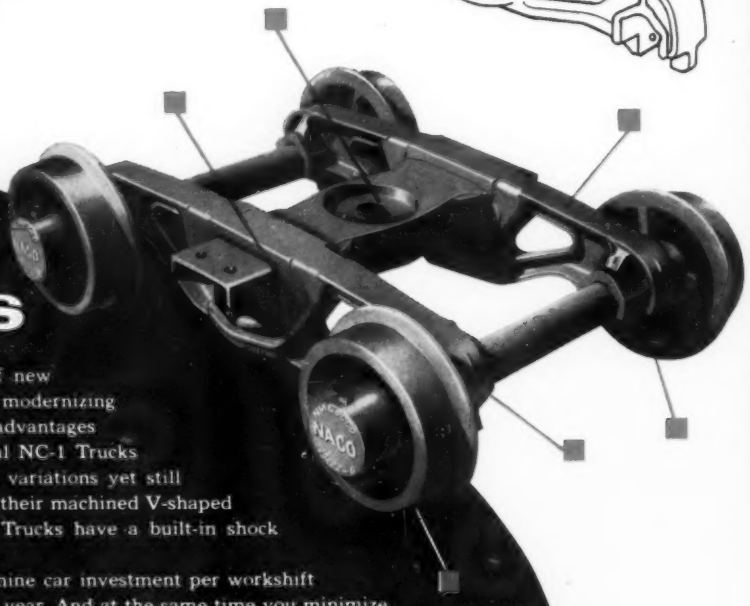
Integral cast frame has no welds or rivets



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If you're considering the purchase of new 8-wheel mine cars . . . or if you're thinking of modernizing older cars—*now* is the time to check the advantages of National NC-1 Trucks. National NC-1 Trucks have controlled flexibility for track variations yet still maintain truck alignment through their machined V-shaped axle grips. In addition, NC-1 Trucks have a built-in shock absorbing mechanism.

You get more out of your mine car investment per workshift . . . per day . . . per year. And at the same time you minimize spillage . . . get greater protection for your equipment, track and structures . . . slash maintenance to a new low.

Yes, *now* is the time to check National NC-1 Trucks—they make sense for 8-wheel mine cars . . . *make dollars for operators*, too.

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MINING WORLD NEWSLETTER

August 1959

ALCOA SEEKS BAUXITE IN JAMAICA . . . Firm has reached agreement with Jamaican government and Caribex Ltd. which holds leases on land near Kingston. Alcoa will spend $200,000 by May 31, 1969 for exploration; then can lease land from Caribex which is subsidiary of American Metal Climax.

A $35,000,000 LOAN TO COMILOG . . . from Export-Import Bank in order to develop manganese reserves at Moanda in Gabon, French Equatorial Africa. U.S. Steel is said to hold a 49% interest.

AMERICAN-METAL CLIMAX LATEST ENTRANT IN SAFFORD, ARIZONA COPPER DISTRICT . . . Firm takes option on 254 claims adjoining Kennecott's recent purchase. Will pay $3,000,000 if options are exercised. Contract covers 4 1/2 years during which American Metal pays $1,500 per month, after a 15-month waiting period.

CANADIAN FIRM BUYS MONTANA IRON ORE MINE. Minerals Engineering Co. has sold its property near Dillon, Montana to North American Utilities Corp. of Canada for $1,000,000 cash plus royalties on future ore. The buyer plans to build a steel mill in Alberta and will use Montana ore.

AUTOGENOUS GRINDING UNITS . . . are being installed by Consolidated Denison Mines in its primary grinding plant near Elliot Lake, Ontario. Changeover is expected to cut costs by (1) eliminating need for steel grinding balls, and (2) reducing acid consumption in leaching phase of uranium treatment.

DETONATION OF NON-NUCLEAR HIGH EXPLOSIVE CHARGES . . . may be attempted in a Louisiana salt mine. AEC is negotiating with Carey Salt Co. Purpose of firings would be to check seismic effects. Involved would be about 10 detonations ranging up to five tons of high explosives.

HOMESTAKE PURCHASES NEW ORE RESERVES . . . Pays $1,350,000 for 25% interest in uranium property of Lance Corporation in New Mexico's Ambrosia Lake district. Lance is subsidiary of Sabre-Pinon Corp.

EXPORT-IMPORT BANK OKS $1,610,000 CREDIT TO TURKEY . . . Money will be used to buy U.S. equipment for expansion of Ana Yatak deposit, and for stripping Mihrap Dagi orebody at Ergani copper mines.

A PROMISING NEW CLASS OF METALLIC MATERIALS . . . has been developed by Battelle Memorial Institute in a research program sponsored by the Lead Industries Association. "Lead-cemented" alloys can be made by mixing molten lead with finely divided solid particles of other metals or materials. Next step is to develop alloys for special end uses.

TWO NEW DIAMOND PRODUCTS DEMONSTRATED BY DE BEERS . . . South African firm has a new natural diamond grit for resin-bonded grinding wheels, said to be 40% more efficient. Also a diamond drilling material, prepared to specific shape and size required for particular job.

USE OF MOLASSES IN AMMONIUM NITRATE BLASTING . . . in place of Diesel oil has been tested by Anaconda Company at Weed Heights, Nevada. Results seem favorable and are described in this issue. Molasses appears to improve density and sensitivity of blasting agent.

ASARCO LEASES ARIZONA LAND FOR TAILINGS . . . Agrees to pay $384,000 in rent over next 25 years for four sections near Tucson held by Papago Tribe.

SUSQUEHANNA-WESTERN WILL USE VITRO ORE FOR NEW URANIUM MILL . . . Has agreed to purchase ore containing 480,000 pounds of concentrates per year to end of 1966. Riverton mill has capacity of 550 tons per day, and will be increased.



Capitol Concentrates

Even Manufacturers Fret Over Imports

The mining business is not the only branch of U. S. industry which is plagued by imports. Generally, manufacturers have been all for cheap raw materials, whatever the source, and have frequently actively opposed attempts to apply quotas or tariffs. However, it depends on whose ox is bored!

The competition from foreign countries on finished materials and industrial equipment has now become so keen that manufacturers are crying, because not even cheap raw materials are saving them from the competition with low-wage countries with excellent equipment and mechanical skills. In some instances companies abroad, operated with funds supplied by domestic companies and frequently with factories built by them, are making the U. S. parents suffer and putting Americans out of work.

According to the American Tariff League imports were up 77 per cent from 1957 and were nearly six times as large as in 1952. The domestic machine tool industry also is disturbed. The same source states that foreign-made machine tools undersell American counterparts by as much as 50 per cent and standard machine tool imports account for about 30 per cent of U. S. total volume. Even sport tackle is being brought in at the rate of about $6.5 million a year.

The minerals industry pays its share of taxes to support the foreign aid program, but can get no relief from the Administration that is substantial. The manufacturing industry rapidly is getting in the same boat. On the other hand, the Marshall-plan countries seem to be doing very well. Even little Laos is subsisting almost entirely on our charity. In this country there are hundreds of thousands of people out of work and if this present policy is pursued there will be many more.

Observers Speculate On USSR Gold Plans

Current reports indicate that the production of gold in the Soviet Union amounts to around 12,000,000 fine ounces per year, or about as much as South Africa. Some people believe that when and if the USSR issues an external, convertible gold ruble, the drain on U. S. Treasury gold will be relieved as Russia does more and more business outside the iron-curtain countries. It also has been assumed that if the Treasury gets short of gold it can buy from countries with hard, stable currencies which have more than enough reserves.

Strong Backing Given Tariff Bill

Senator James E. Murray of Montana and 18 other Senators (including Senator Kerr, a member of the Senate Finance Committee to which the bill was referred) have introduced S. 2169, a bill to amend the Internal Revenue Code. This bill would adjust upward the import duties on lead and zinc and plug the loopholes in imports of finished and semi-finished lead and zinc products created by the lack of protection from such imports in the President's zinc-lead quota plan.

There seems to be little doubt but that Administration agency reports to the Congress on the bill will be adverse, although there is a possibility that Senator Kerr and some other mining Senators may be able to have the new bill reported favorably by the Senate Finance Committee. It will face a stiff fight on the Senate Floor if so reported, but might just be passed. Observers express considerable doubt that the bill will get by in the House, where it must be handled by the Ways and Means Committee. That committee, when it has had similar bills before it, always referred the situation to the Tariff Commission. Of course, if a satisfactory report is made, as it was the last time, it ends up with the President, who imposed the inadequate 80 per cent quotas.

S. 2169 is intended to supplement, not to replace, the quotas. If, however, the bill should be passed by the House and the Senate, it seems likely that the State Department will recommend that the President suspend the quota system, something that it probably would dearly like to do.

Seawater Gold Again In The News

Years ago one of the prime stock swindles was with the "gold from seawater" promotions. Times change, however, and the success of the Dow company in extracting magnesium and other chemicals from seawater has revived the idea. Some years ago Dow, who was pumping the water through its plant anyway, extracted some gold on an experimental basis, but the cost was too high. Now there is being advertised "a substantially new process" which will "secure a virtually stable, direct, inflation-proof income." Perhaps Secretary of the Treasury Anderson should look into this one!

Educational Publicity Needed In East

The hearings held upon the Aspinall resolution (H. Con. Res. 177) by the House Interior and Insular Affairs Committee were designed to be among the most exhaustive ever held on domestic minerals and government policy regarding domestic mining. Of course the field has been quite thoroughly covered, both in the House and the Senate, by a series of hearings over a period of time, mostly on various bills, and without much in the way of concrete results. While the Aspinall hearings are not expected to have any radical effect upon the Administration's mineral policies, especially stockpiling, they have provided a good deal of educational publicity. The trouble is that most of it will not be read by the general public. Coverage has been good only in the trade papers and the western press, whereas it is the Easterners who need to be indoctrinated.

Mineral Policy Resolution Introduced

On June 9 Senator James E. Murray introduced S. J. Res. 107 setting forth a national mineral policy and directing the Secretary of the Interior to evolve a plan, within the Congressional policy outlined in the bill, for keeping the domestic mining industry in a healthy condition at all times. The Secretary is instructed to make a report to the Congress every six months on the economic status of each of the domestic mineral industries of the United States. He also is instructed to transmit to the Congress plans for aiding the mining industry and suggesting such legislation

Continued on page 10

Dependable testing equipment for 83 years...

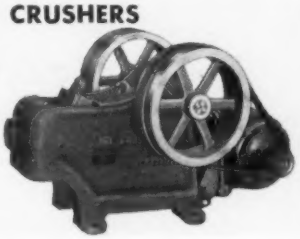
Melting, refining, processing, production—all begin with accurate, uniform *testing*. Denver Fire Clay products and equipment have been serving the testing field for 84 years, efficiently and economically—and this is your assurance of accurate, trouble-free testing year after year after year.

Write for full information about any of the products on this page. Other DFC quality products include fire brick and special shapes, refractory specialties, industrial furnaces, burners, and incinerators.

DFC LABORATORY CRUSHERS

Fast—Rugged—Economical

For reducing ore, rock, or brittle substances from 2½ to ¼ inches in diameter or smaller, at rates of 50 to 150 pounds per hour.



DFC ELECTRIC ASSAY FURNACES

Accurate—Dependable



Rugged open-hearth-type furnaces, designed and built for accurate, uniform assays, and greatest return on your money. Fast-heating, U-shaped, nickel-chrome heating elements are supported in specially designed refractory blocks—insure maximum heat reflection. Furnace lining is backed with high and low-temperature insulating brick. Entire unit is encased in welded steel jacket. Wide doors provide easy access to crucibles. Indicating-controlling-type pyrometer insures absolute, constant control of temperature and atmospheric condition for cupeling.

Available in two models which offer a choice of automatic or manual control. Capacity: thirty-five 20-gram or twenty-four 30-gram crucibles. Also gas and oil-fired assay furnaces.

DFC METALLURGICAL CLAY GOODS

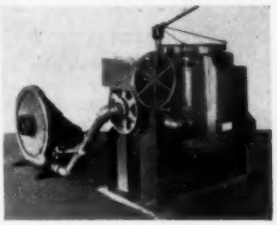


DFC Clay Goods—crucibles, annealing cups, muffles, trays, roasting dishes, scorifiers and ignition dishes—are world renowned for quality and dependability.

DFC CRUCIBLE MELTING FURNACES

Fast—Efficient

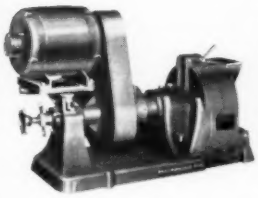
Designed for continuous operation to 2200° F., and extensively used for melting gold, silver, cyanide precipitates, brass, and other non-ferrous metals. Stationary types are available in seven models, to accommodate seventeen crucible sizes, ranging from #30 (282-cubic-inch capacity) to #400 (3,765-cubic-inch capacity). Manual tilting types are also available in seven models, to accommodate sixteen crucible sizes, ranging from #40 (377-cubic-inch capacity) to #400.



Burner systems are adaptable to gas or oil-firing. Design simplicity insures easy maintenance.

DFC PULVERIZERS

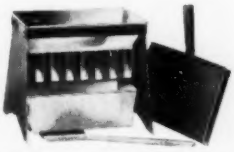
Disc-Type—Direct Drive



Perfect companions to DFC Crushers. Medium quartz ore can be reduced from ¼ mesh size to 100 mesh at the rate of 1.4 pounds per minute. Any degree of fineness up to 120 mesh is obtained by turning a hand size-wheel at the rear of the machine, and a lock nut holds any adjustment.

SAMPLERS

Available in sizes from 5 by 4½ inches to 18 by 10½ inches hopper-top. Jones Pattern Samplers also available.



DENVER FIRE CLAY COMPANY
3303 Blake Street, Denver, Colorado

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Denver Fire Clay Company

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"FLYGT PUMPS ARE EASY TO MAINTAIN . . . ECONOMICAL TO OPERATE,"

reports an Arizona Copper Mine

In the inclined shaft of a large Arizona copper mine near Tucson, all mine water drains into a sump at the 700 foot level. Dewatering is a problem because the mine uses a sand-fill type stoping operation, and sand overflow, which seeps into the shaft sump, must be pumped out along with the clear water.

In October 1956, the mine operators replaced a 10 hp, single stage, conventional type centrifugal pump with a 6 hp Flygt Model B-80L Submersible Electric Pump to work against a plus 90-foot head. Under the conditions described, with much of the sand containing abrasive garnet, the centrifugal pump repeatedly was fouling up, casings and impellers were constantly wearing out, and motors needed rewinding an average of once a month due to water intrusion. After over a year's experience with the Flygt Pump, the mine's Mechanical Superintendent reported that Flygt was handling the job easily . . . needed only six impeller replacements in 14 months time, some diffuser plate replacements, and only a few other minor repairs.

On top of excellent performance under tough conditions, the owners stated the Flygt Pump was easy to install with a simple electric hook-up, light in weight for easy handling, and that Flygt eliminated excessive labor in set-up and placement time when service was necessary.

In addition to the Flygt B-80L Pump in the shaft described above, this particular mining company uses a Flygt Model B-38L to pump out the mill sump, containing dirty, gritty washings, and still another Flygt in a second shaft. The Mechanical Superintendent states, "All Flygt Pumps are easy to operate, easy to maintain, and economical to operate."

Flygt centrifugal Pumps range in size from 1½"-85 GPM capacity to 8"-3,000 GPM capacity. Head capacities range up to 210 feet. Weights range from 80 to 1,200 pounds.

CHECK THESE FLYGT FEATURES

- ✓ Electric
- ✓ Resistant to Salt Water
- ✓ Submersible
- ✓ Easy to Handle
- ✓ Low Maintenance Costs
- ✓ Will pump High Amount of Solids
- ✓ Heavy Duty
- ✓ Continuous Duty
- ✓ Runs Dry Without Damage
- ✓ Quick and Easy to Service
- ✓ No Installation Costs
- ✓ No Priming Needed



FLYGT

WEST OF THE MISSISSIPPI:

Stancs MFGS. & SALES INC.

1666 Ninth St.
(Corner of Olympic & Ninth)
Santa Monica, California.

EAST OF THE MISSISSIPPI:

STENBERG MANUFACTURING CORPORATION

Hoosick Falls, N.Y.

as may be necessary.

Senator Murray pointed out in a statement made when he introduced S. J. Res. 107 that he helped generate the Roosevelt mineral policy of April 24, 1943, which, he said, "seems to have been completely forgotten." The Senator also pointed out that he tried to generate a congressional mineral policy when he introduced S. J. Res. 148 in February of 1956. He further remarked that "if the Administration will not announce and follow a sensible mineral policy, the Congress must speak."

It certainly is high time that something along this line is done!

DPA Inventory Holds Excess Materials

During hearings before the House Appropriations Committee, Defense Mobilizer Leo A. Hoegh reported that as of March 31, 1959, the government had a $1,300,000,000 inventory of metals and other materials bought under Defense Production Act guaranteed contracts. Until recently, he said, it was assumed that much of these materials could be sold to the government's strategic stockpile to fill stockpiling needs, but this has been made impossible by a sharp reduction in stockpile objectives.

Moreover, he testified, the minerals acquired under the DPA guarantees cannot be sold on the open market at the moment in any sizable quantities without disrupting world market prices.

GSA Administrator Franklin Floete estimated the DPA inventory had an excess of $327,000,000 of aluminum, $72,000,000 of copper, $46,000,000 of columbite, $97,000,000 of nickel, $59,000,000 of magnesium, $219,000,000 of tungsten, and $6,000,000 of cobalt.

UN Reports On Gold Losses

The latest World Economic Survey, released by the United Nations, insists that there has been no evidence of a flight from the dollar. Although sales of U. S. gold to foreign governments totaled about $2,300,000,000 in 1958, the report said, short-term dollar assets held by foreign countries increased by more than $1,100,000,000. More than half of this amount was absorbed by the same European countries which were buying gold, the U. N. added.

The gold reserve of the United States is still stronger than that of any other major trading country, with this country still holding more than half of the world's monetary gold outside the Soviet Union, the U. N. explained. Therefore, it said, there is slight chance that the United States economy will run into trouble from the continuing decline in its monetary reserves.

From another source came the statement that U. S. gold losses are helping to bring international finance and trade in better balance. According to testimony by Charles P. Kindleberger, economist with Massachusetts Institute of Technology, these gold losses (about $3,000,000,000 since the start of 1958) have been caused chiefly by increases in U. S. investments abroad and in imports of foreign goods.

COMING CONVENTIONS

September 14 through 17. Annual convention WESTERN DIVISION AMERICAN MINING CONGRESS, Brown Palace Hotel, Denver, Colorado.

October 4 through 10. The 26th INTERNATIONAL FOUNDRY CONGRESS, sponsored by the Instituto Del Hiero y Del Acero and the Higher Council for Scientific Research Spain, Madrid, Spain.

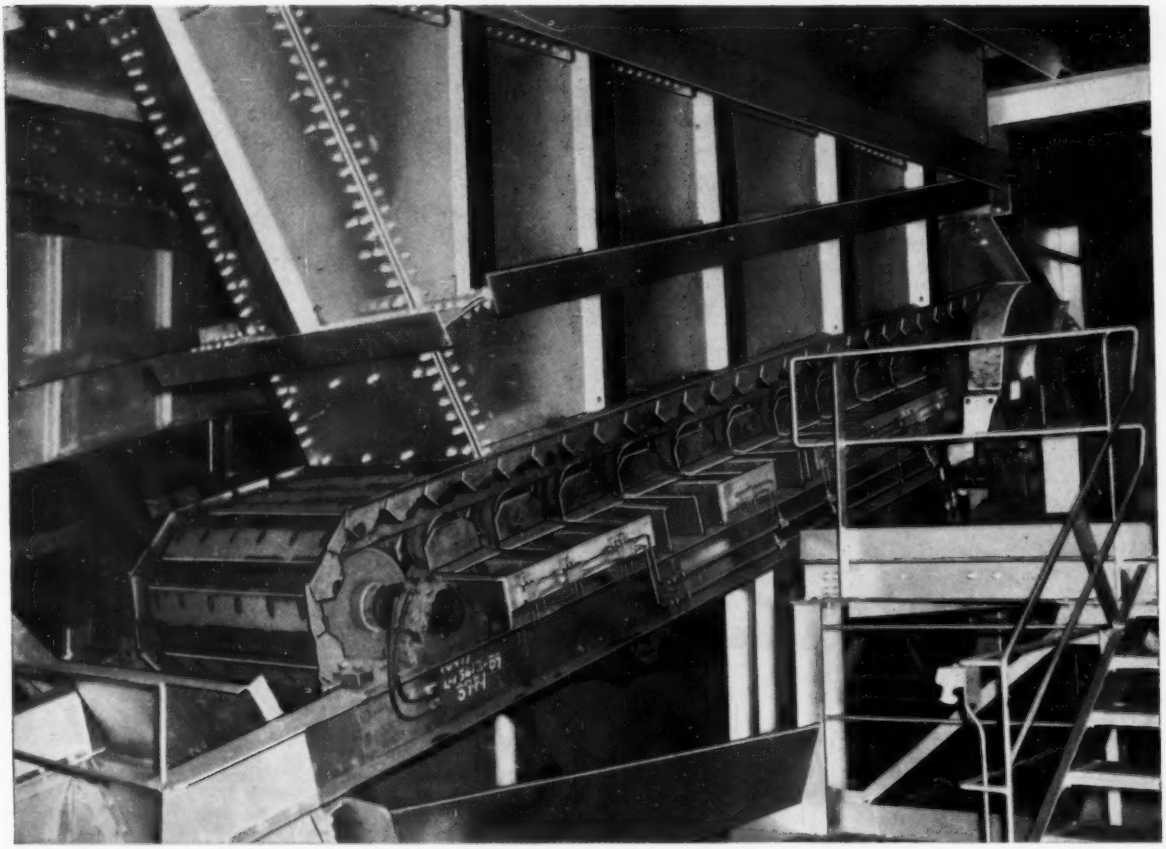
October 7, 8, 9. Sixth NATIONAL SYMPOSIUM ON VACUUM TECHNOLOGY, sponsored by the American Vacuum Society, Sheraton Hotel, Philadelphia, Pennsylvania.

October 12, 13, and 14. Eighth NATIONAL CLAY CONFERENCE, University of Oklahoma, Norman, Oklahoma.

October 19 through 22. Mining section of the NATIONAL SAFETY CONGRESS, Chicago, Illinois.

IN MINNESOTA IRON MINES

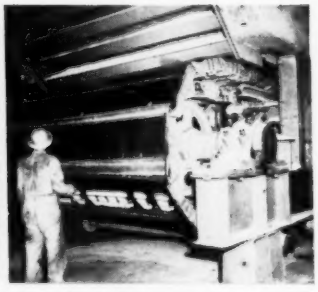
STEPHENS-ADAMSON



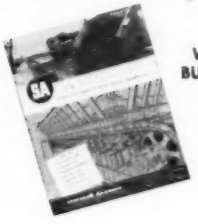
FEEDERS FOR BIG TONNAGE CONTROL AT LOWEST OPERATING COST!

The experience of STEPHENS-ADAMSON engineers in the design and construction of Feeders and Apron Conveyors extends from the handling of Potash at Carlsbad, New Mexico to the gold mines of Africa, from the nitrate and copper mines of Chile to the giant Seven Islands iron ore range in Canada. From light duty units to giant AMSCO Feeders built to take the impact delivered by thousands of tons of run of mine, ore and stone, S-A engineers have a world of "know-how" in the design of efficient, profitable Feeders. STEPHENS-ADAMSON engineers will be happy to work with you on any bulk materials handling problem.





AMSCO Manganese Steel Pan Feeders handling copper ore at a Southwestern mine.



WRITE FOR BULLETIN 255

S-A

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SPEEDWALK® PASSENGER CONVEYORS

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One P&H sells another because

P&H "PROFIT·TONS" reduce loading costs... even in hardest digging

Up to 30% higher bail pull—faster swing—exceptional physical strength of P&H welded construction—greater job availability all add up to as much as 10% more production, lower loading cost per ton and *more net profit* for owners of P&H Electric Mining Excavators on their hardest digging assignments.

P&H "Profit-Tons" are the end product of these *exclusive* P&H design principles:

MAGNETORQUE* . . . the most productive digging motion drive known for electric excavators. This *patented* P&H drive electro-magnetically transmits full digging power from an A. C. hoist motor direct to the dipper without motor generator set conversion to D.C. current. It gives higher bail pull, better dipper fill factor and automatic impact protection to the digging machinery.

ELECTRONIC CONTROL . . . the most responsive control for electric excavators. This *patented* P&H control accomplishes the quickest work motion reaction time and gives the greatest cycle productivity known.

In addition, with P&H—and only with P&H—do you get the service assurance of single source responsibility. P&H manufactures their own electrical as well as mechanical components—*designed specifically for electric excavator service.* Write Dept. 556, Harnischfeger Corporation Milwaukee 46, Wisconsin.

P&H LINE:

Electric Excavators:	3½ through 10 yds.
Diesel Excavators:	½ through 3¼ yds.
Truck Cranes:	10 through 80 tons

P&H **MINING EXCAVATORS**

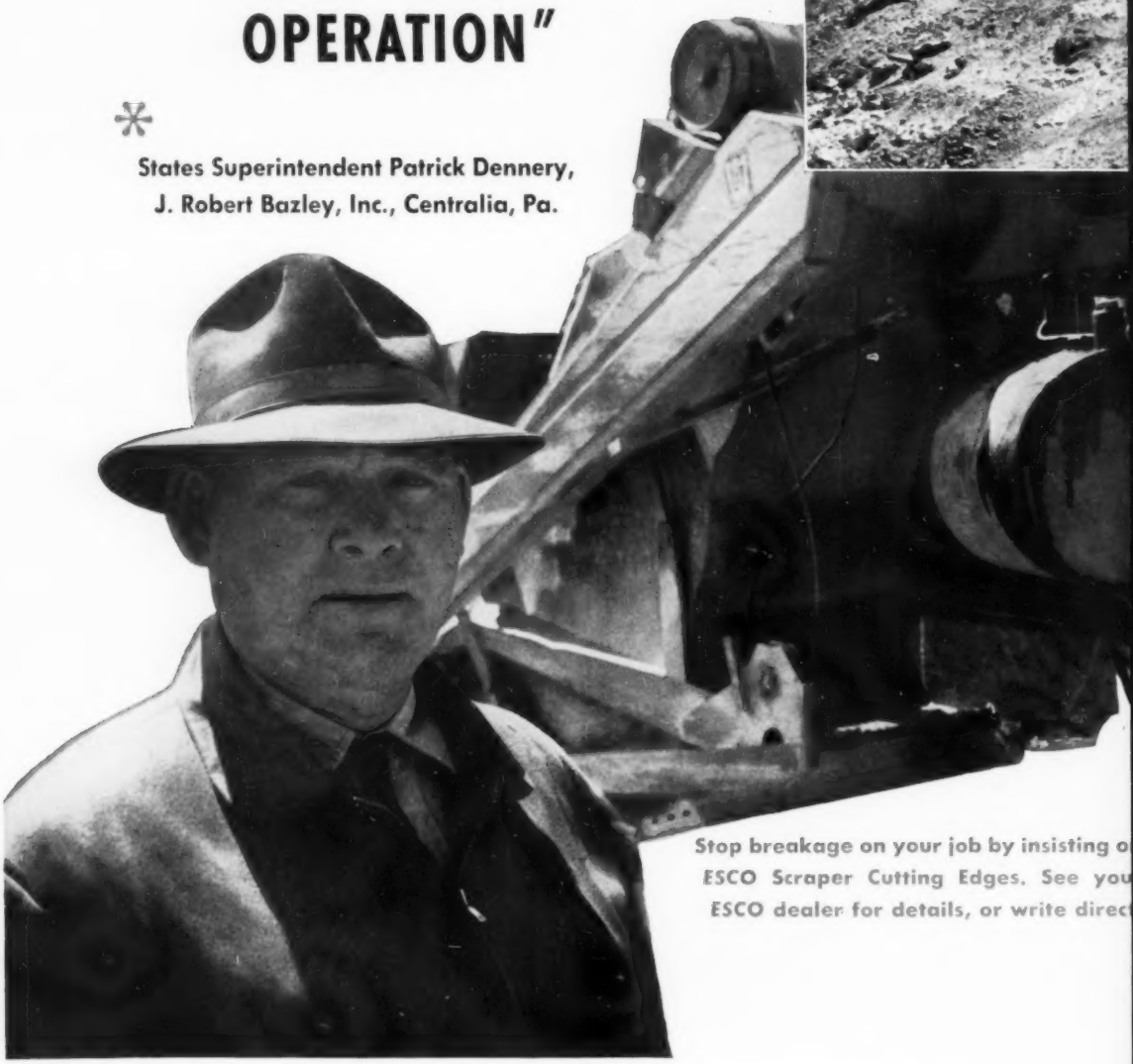
HARNISCHFEGER CORPORATION
Construction & Mining Division
Milwaukee 46, Wisconsin

"ESCO SCRAPER CUTTING EDGES HAVE GIVEN US COMPLETELY BREAKAGE-FREE OPERATION"

*

States Superintendent Patrick Dennery,
J. Robert Bazley, Inc., Centralia, Pa.





Stop breakage on your job by insisting o
ESCO Scraper Cutting Edges. See you
ESCO dealer for details, or write direc



*

"We have to fight for every inch of soil we remove", explains Dennery, superintendent on the J. Robert Bazley, Inc., open pit coal mine at Centralia, Pennsylvania. "And cutting edge breakage seriously affects the efficiency of our operation. The scraper cutting edges we were using previously were prone to breakage. Gashes up to 4" deep would occur. But *ESCO* blades, which we have been using exclusively for over three years, have never shown the least sign of chipping.

"Furthermore", continues Dennery, "*ESCO* scraper cutting edges give us longer service than our previous blades. The task of reversing or replacing blades is definitely made easier by *ESCO*'s two-section design of the center blade." Concludes Dennery, "*ESCO* Scraper Cutting Edges give us the low down-time insurance that is imperative on our operation."

QUICK-CHANGE CENTER SECTION

Four-piece design of ESCO scraper cutting edges simplifies the task of reversing center sections and reduces down-time.



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EVERYTHING'S BIG ABOUT THE D9

. . . *including economy!*

You don't sacrifice economy for big production when you step up to a Cat D9 Tractor. When you see big loads of pay dirt rolling in front of a D9—those can be the most economical yards in strip mining today!

Arrington Mining Co. has found this out at its open pit iron ore mine at Troy, Alabama. Its D9 with No. 9S Bulldozer economically strips overburden that is up to 25 feet thick.

Besides, partner Tom Arrington says, "The D9 is worth what you pay for it in dependable service—and I find Cat machines have a high resale value."

Many features contribute to the outstanding economy and resale value of the big D9. To name a few: dependable Cat Diesel Engine with new dry-type air cleaners, the exclusive Caterpillar oil clutch, strong main frame and final drives, long-lived, extra-rugged undercarriage, including lifetime lubricated rollers and idlers.

Get all the facts on the mighty D9—and a demonstration on your strip mining operation—from your Caterpillar Dealer.

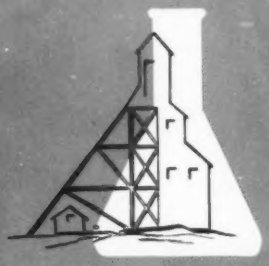
Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U.S.A.

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THE D9... BIG IN PRODUCTION, BIG IN ECONOMY





CYANAMID

REAGENT NEWS

"ore-dressing ideas you can use"

AEROSOL® OT

SURFACE ACTIVE AGENT

improves filtration, cuts concentrate drying and shipping costs

Effective filtration aid that lowers the water content of the filter cake, AEROSOL Surface Active Agent has produced these typical savings at metallic and non-metallic operations:

SULFIDE ZINC CONCENTRATES

AEROSOL OT-75% is fed as a 1% solution to the launder carrying concentrates to the filter at the rate of only 0.07 lb. per ton of concentrates. Moisture content of concentrates is cut by two percentage points, filter cake is easier to handle, less filter blinding occurs. Metallurgy is not affected by recycle of filtrate to flotation.

Use of 4¢ per ton of AEROSOL OT has cut concentrate freight costs 10¢ per ton!

SILICA SANDS

AEROSOL OT-75% is fed as a dilute water solution at the rate of 0.025 lb. per ton of sands going to a horizontal sand filter. Moisture content of filtered sands dropped from 6.5% to 4.5% with a resulting saving of 11.0¢ per ton in drying costs.

Thus, a penny per ton for AEROSOL OT with a resulting drop of 2 percentage points in filtrate moisture produced a net saving of 10¢ per ton on preparation costs.

AEROSOL OT Surface Active Agent is available both as a dry solid 100% grade and as a 75% aqueous solution. Phone or write our nearest office for technical data, working samples and price quotations.

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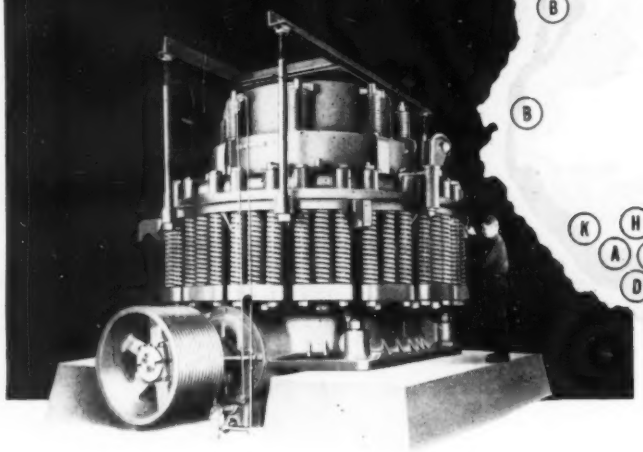
AMERICAN CYANAMID COMPANY
EXPLOSIVES AND MINING CHEMICALS DEPARTMENT

CYANAMID INTERNATIONAL — *Mining Chemicals Department*
Cable Address: — Cyanamid, New York

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SYMONS® CONE CRUSHERS

play important role in processing ores and minerals in *South America*





In all of the important ore and mineral operations around the world . . . Symons Cone Crushers have consistently maintained a preferred position by efficiently processing large tonnages of finely crushed product at low cost.

In South America, scores of Symons Cones are used by leading producers of many of the country's ores and industrial minerals. Included in this group are the well known nitrates and copper ore of Chile . . . the tungsten, copper and vanadium of Peru . . . Bolivia's tin, second in world production . . . as well as the great mineral reserves of Brazil.

The use of Symons Cone Crushers in South America serves as another good example of the way these efficient reduction machines serve the mining and mineral processing industries of the world.

NORDBERG MFG. CO., Milwaukee 1, Wisconsin

SYMONS CONE CRUSHERS
. . . The machines that revolutionized crushing practice . . . are built in a wide range of sizes, for capacities to over 900 tons per hour. Write for descriptive literature.

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Du Pont Announces the ACUDET® SERIES of Delay Electric Blasting Caps

Greater Dependability and Accuracy

A new series of delay electric blasting caps with accurately spaced delay intervals which eliminates all possibility of overlapping—a major forward step in delay blasting control.

The new Du Pont Acudet® Delay Electric Blasting Caps provide new standards of accuracy and dependability in regular delay blasting. Manufactured to closer timing tolerances than ever before possible, the new series assures positive intervals of 1/10 to 1/2 second between each period throughout the entire series of 14 delays.

There are 14 delay periods available in the Acudet series with a total spread of 8½ seconds. The timing of each period has been carefully selected in order to provide optimum blasting results.

No arcing failures

The Acudet Series of delays can be fired in series, straight parallel, or parallel series hookups without arcing failures at any voltage commonly used. When the first-period Acudet Delay fires in 1/10 of a second and breaks the circuit, damaging arcs do not have time to form. This eliminates the need for a special circuit-breaking cap in the lead line or for expensive special timing equipment with its limitations.

Field experience with Du Pont Acudet Delays has shown the following advantages:

1. More muck per round—less bootleg.
2. No loose powder in the muck pile—increased safety.
3. Easier loading—more uniform fragmentation.
4. Easier to make primers—Acudet Delays are shorter.
5. Corrosion resistant aluminum shells.*

In common with all other Du Pont Electric Blasting Caps, Acudet Delays are mechanically assembled with nylon plastic insulation on the leg wires, rubber plug closures and shielded shunts.

For further information, contact your Du Pont Explosives representative or write to E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

**Copper shells on request*

DU PONT EXPLOSIVES
REG. U.S. PAT. OFF.

Better Things for Better Living . . . *through Chemistry*

now at your Allis-Chalmers dealer

the ONE FORTY FIVE—

OUTSTANDING VALUE IN

MEDIUM-POWER GRADERS

80 hp 21,540 lb

...with features you can't match for the money on any grader

The new Allis-Chalmers ONE FORTY FIVE motor grader is built to outwork and outproduce any grader near its size...at a price you can't afford to overlook. An exclusive combination does it: high capacity front axle and throat clearance, big-grader power train, ROLL-AWAY moldboard, plus benefits that help an operator to do more work.



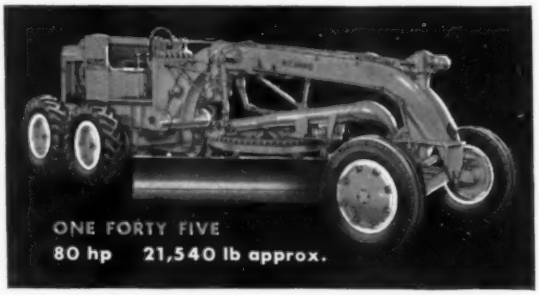
The ONE FORTY FIVE power train is built for long grading service. Simple, dry-type ceramic-lined clutch; constant-mesh transmission; heavy-duty gear train — all much stronger than you usually find in a grader this size.

Big clearance under the front axle straddles huge windrows without drag. Watch the ROLL-AWAY moldboard lift and roll the load. Check the load-clearing height from cutting edge to circle. You'll get more grading production than any other medium-sized machine can give you.

Now check these operator advantages. Platform is clean and roomy. Suspended pedals provide matchless foot room. Full visibility all around takes the strain out of operating. Toggle-type control levers allow ample road feel without wrist-snapping backlash.

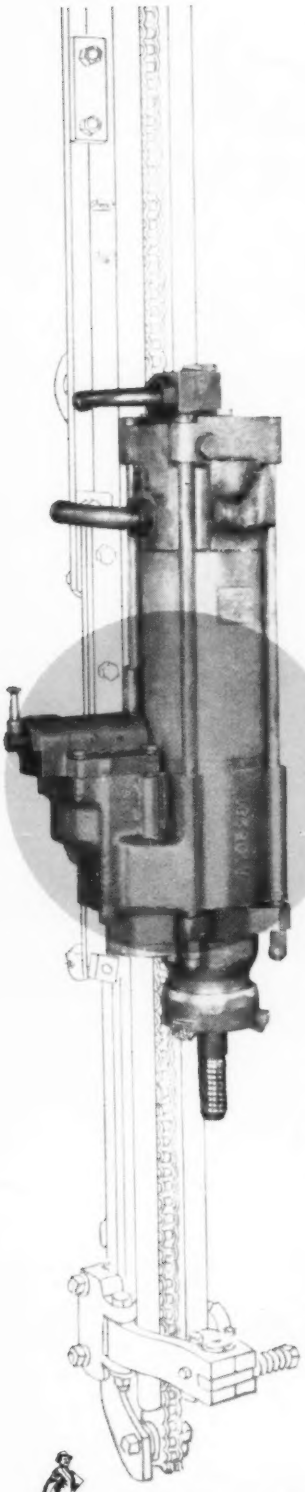
Your Allis-Chalmers dealer will show you an eye-opening demonstration of the ONE FORTY FIVE. Then keep its low cost — and high performance — in mind when you're ready to buy. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

ROLL-AWAY is an Allis-Chalmers trademark.

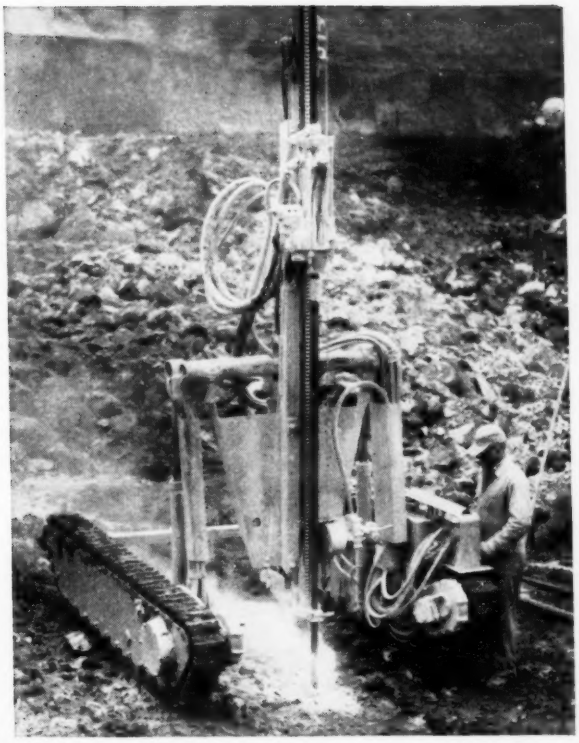


move ahead with **ALLIS-CHALMERS**

...power for a growing world



The 450-DR is available on several self-propelled carriers, including the completely automatic TDM Trac-Drill shown at the right.



Another Joy First

The 450 DUAL Rotation Drill

• 25% Higher Drilling Speeds
• Faster Steel Changes

In competitive demonstrations of 4½" bore drills, the new Joy 450-DR not only drilled faster, but also finished blastholes which the conventional reverse rotation machines could not bottom.*

Dual Rotation, which made this superior performance possible, is provided by a powerful vane-type air motor geared to the chuck. It provides a booster to normal drilling rotation, and gives extra rotation power while actually reducing the strain on the rifle bar.

Dual Rotation will also cut your costs because (1) there is no hammering action while coupling or uncoupling—drill steel threads, couplings and striking bars last longer; (2) all four pawls in the 450-DR are used only for forward rotation, not two for drilling and two for reversing—excessive pawl wear is eliminated; and (3) with Dual Rotation, reversing is not rifle bar actuated, therefore rifle nuts cannot back off—less downtime.

Let us prove the superiority of the new Joy 450-DR Drill. Your nearest Joy Office or Distributor will be glad to arrange a demonstration of this remarkable new drill.

C 7577-316

*Competitive test results available upon request.

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WHEEL TRUEING TOOL CO.
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WHEEL TRUEING TOOL COMPANY
3200 W. DAVISON AVENUE • DETROIT 38, MICHIGAN
Member DIAMOND CORE DRILL MANUFACTURERS ASSOCIATION



Rear-Dump "Eucs" have payload capacities of 10 to 50 tons—are powered by engines of 132 to 670 total h.p. . . . have loaded speeds up to 41 mph.

For Lower Hauling Costs in Mines and Quarries Check Euclid Performance

Open pit mine and quarries the world over have standardized on Euclid equipment for moving earth, rock, coal and ore on tough off-the-highway hauls. They know from years of experience on their own operations that "Eucs" get more work done every shift—that production cost is lower than with other types and makes of equipment.

Euclid has a complete range of sizes and models to fit every job requirement—rear dump and bottom dump haulers, self-powered scrapers and the world's most powerful crawler tractor. Your Euclid dealer will be glad to provide a production-cost estimate on your present or planned operations—be sure to see him before you replace or add to your equipment fleet—and have him show you why Euclids are your best investment.

EUCLID Division of General Motors Corporation
Cleveland 17, Ohio



Bottom-Dumps carry 13, 17 and 25 cu. yds. struck . . . special coal hauler trailers have capacities of 25, 40 and 51 tons. Full length, unobstructed door opening make these "Eucs" ideal for dumping free-flowing material into drive-over hoppers.



The TC-12 Crawler has 2 engines and independent track drive . . . 425 net h.p. . . . full power shift . . . top speed of 7.8 mph. This "Euc" tractor has unequalled work-ability for heavy dozing, ripping and similar work in mines and quarries.



This "Twin" Scraper has 2 engines with Torqmatic Drive . . . all wheel drive permits self-loading . . . struck capacity is 24 cu. yds. There are six other Euclid Scrapers, overhung engine and six wheel types, with struck capacities ranging from 7 to 24 yds.—9 to 32 yds. heaped.

GM GENERAL MOTORS EUCLID

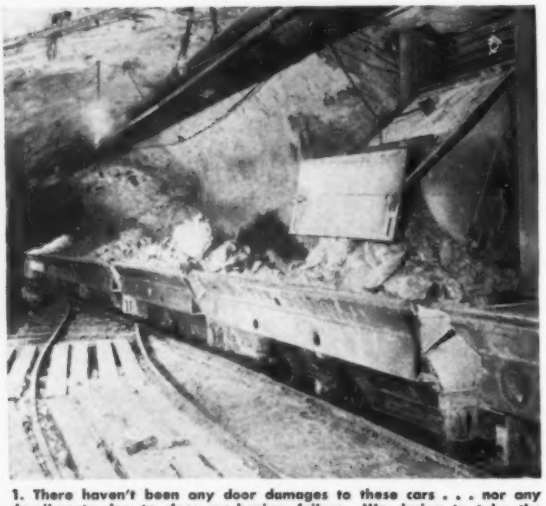
EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

Member DIAMOND CORE DRILL MANUFACTURERS ASSOCIATION

This is the most economical

Haulage cost, including maintenance on these S-D Automatic Bottom Dumping Cars, the locomotive plus labor for haulage, is less than 5¢ a ton!



1. There haven't been any door damages to these cars . . . nor any derailments due to door mechanism failure. We design to take the service. We know of many derailments of other type cars due to high center of gravity, dumping members sticking out on the side of cars, etc. We invite you to ask those who have experienced the dependability and economy of our S-D Automatic Bottom Dumping Cars.

BUT, you might ask, *how it is possible for bottom dumping mine cars to take such punishment?*

Can the hinge and latch mechanisms take the impact of shock loading?

It doesn't appear bottom dumping cars could have continuity through the center. Then, isn't the drawbar and buffing of the loads taken from the coupler out to the sides, through the sides and around them?

Do the latch mechanisms and hinges, no doubt foolproof in coal or potash service, become hopelessly clogged when running through wet muck which contains clay, leached ore, etc.?

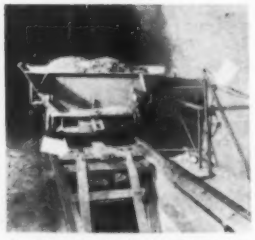
The answer to all these questions is that S-D Automatic Bottom Dumping Mine Cars can be designed to meet any, all and every requirement.

Let's take those pictured on this page in operation in a hard rock mine, and give you the specific reasons in answer to your well put questions. Then mention the general advantages of bottom dumping cars, such as automatic dumping without labor, which provide the most economical way to haul rock and ore.

This car was designed more along the lines of coal cars. No special consideration was given for severe loading conditions. The mine that purchased them had previously experienced 15 years of hard rock service with similar S-D Automatics, also designed for coal service.

After five years service, they are averaging 8¼ tons of hard rock and making more than 12 turnovers per shift. One man, his locomotive and 10-cars-only in a trip frequently load from three different chutes and dump 125 cars in a shift.

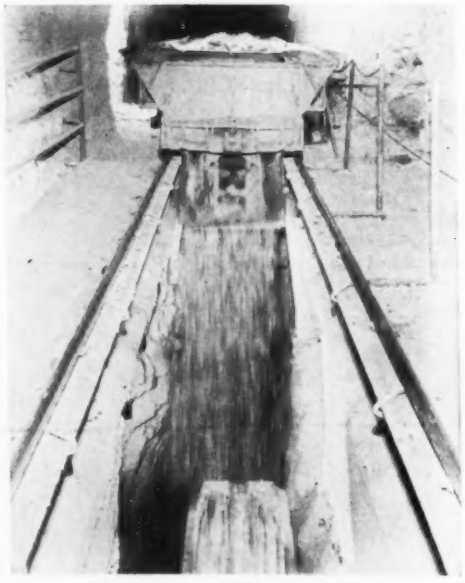
As we have reported, their haulage cost, including maintenance on both cars and locomotive plus labor for haulage, is less than 5¢ a ton.



2. Note the Twin Unlocking Devices prior to being raised remotely by operator from his locomotive.



3. The Twin Safety Latches on S-D Automatics must be operated independently but simultaneously to open doors. Only mechanism that can achieve this is the Twin Unlocking Devices mounted between rails at the dump.



4. Here is an action picture, showing first car in trip of 10-cars dumping on-the-move. Part of the Automatic Door Re-Locking Mechanism may be seen in lower part of picture.



5. This is a difficult picture to obtain, but you may see image of door during the Automatic Re-Locking action as trip continues its non-stop dumping and return for re-loading.

way to haul hard rock and ore

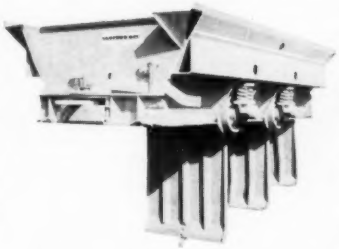
A few of the latches have been broken and a few of the trunnions have been bent during those five years. On repeat orders for cars to operate under similar service conditions, we are using T-1 Steel in the trunnions as well as a fabricated steel latch, which eliminate these minor, in-frequent repairs.

Note that the car is otherwise designed for shock loading, having spring mountings. We have also furnished rubber mountings.

The S-D Automatic's Twin Jerk-Out mechanism is located well above the rail. As far as wetness of muck, the service has been severe, but no difficulty has been experienced.

You may see in inset picture at right this S-D Automatic prior to shipment. You have here a photographic comparison of the car prior to installation, then after five years service.

We can prove by mathematics, and can back mathematics with more than 40 years experience in building bottom dumping mine cars, that our car structure, as far as side sills, bumper construction, etc., is designed to take drawbar pull and buff of heavy trains. In fact, this construction is many times stronger than such items as tail bolt or standard link or pin.



You will be interested in the S-D Automatic pictured below. Here is one of our designs for extremely heavy duty. Further it was developed to solve particular handling problems.

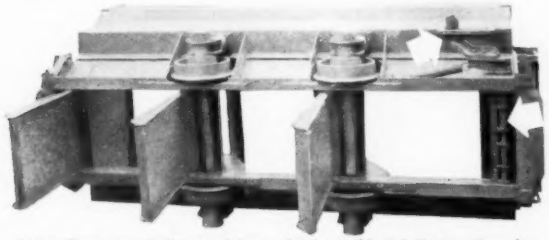
The material this customer handles is very sticky and will not shed well. They had tried all types of cars, including side dump, rocker, gable, etc. They felt they had a better chance of getting the muck out of our S-D Automatic Bottom Dumping Car. Their judgment has proved correct.

These S-D Automatics were designed with all flares on 60 degrees. Too, false bottom doors were furnished to also aid in clean shedding.

They also wanted the largest possible car in drift driving. This would cut down on car change. The S-D Automatic enabled them to obtain the greatest capacity for overall dimensions that could be let down the shaft without dismantling.

Automatic couplers were shipped separately for mounting underground.

The cars were equipped with 18" wheels with spring mounted trucks.



Note (by arrows) the special cam latch on this S-D Bottom Dumping Car and full width door support. This car was designed specifically for handling iron ore, plus it enabled the customer to obtain more capacity within their dimension limitations than any other type car they could buy!

Note special cam latch at rear end for full width door support.

What we are discussing here is an S-D Automatic specifically designed for hauling iron ore and tailor-made to a customer's requirements. Some of the major specs on the car you may like to know are: 36" Track Gauge . . . 46" Wheel Base . . . 15' 6" long . . . Shipping Weight 9,440 lb.

Only bottom dumping mine cars effectively provide automatic, no labor, dumping. Only bottom dumping mine cars provide for such simple, low cost dumping facility. Too, S-D Automatics enable you to use large ore pass as surge bin to keep continuous supply of material for uninterrupted operation of mill . . . keeps mill and mining operations separate for efficient operation of each.

We believe the two requirements to obtain the most economical haulage system are (1) Minimum capital investment in haulage system, and (2) Minimum direct operating costs.

The reasons why S-D Automatics best meet these two requirements are:

MINIMUM CAPITAL INVESTMENT—

a. More tons per car per shift hauled (fastest car turnover) which means LESS CARS needed!



b. Maximum loading speeds (see inset picture at right showing how cars pictured on page at left are loaded by locomotive operator himself. Note the remote controls. They can operate locomotive remotely, or S-D Hydraulic Car Spotter or S-D "Brownie" Hoist, and open and close the chute).

c. Maximum dumping speed (automatic non-stop without labor)

d. Maximum surge bin capacity (no loaded cars waiting at dump)

MINIMUM DIRECT OPERATING COST—

a. Automatic controlled loading

b. Fewer cars and fewer locomotives

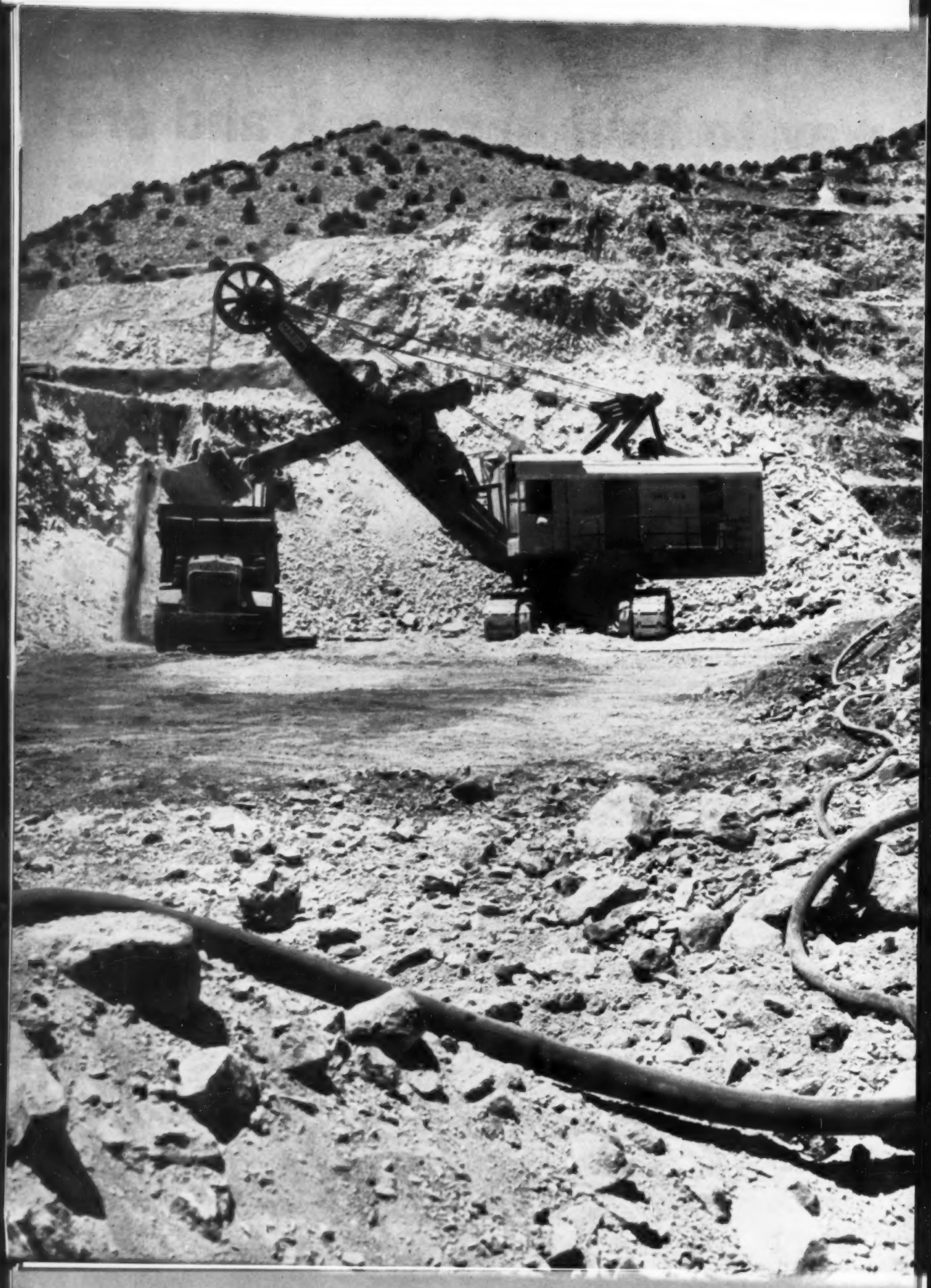
c. Automatic Dumping (no men required)

We hope we have pointed out here by actual case experiences answers to questions you have had . . . that you are satisfied immediate consideration should be given to these S-D Automatics . . . that you want to get in touch with us to discuss the matter in detail. Every haulage situation is an individual problem, and it is your situation we both are interested in at this moment. May we hear from you? *Sanford-Day Iron Works, Inc., P.O. Box 1511... Telephone 3-4191, Knoxville, Tennessee*

SANFORD-DAY

KNOXVILLE, TENNESSEE

MINE CARS—all types . . . S-D Brakeman Cars . . . S-D Man Cars . . . S-D Hydraulic Car Spotters and S-D "Brownie" Hoists . . . S-D Automatic Loading Stations for mine and railroad cars . . . S-D "Floater" Wheels . . . S-D Mine Sheaves and Rollers . . . S-D exclusive Hard-Facing Process that puts old wheels back in operation for years of additional service.





YOU GET LONGER LIFE OUT OF ANACONDA SH-D SHOVEL CABLE— WE PROVED IT IN OUR OWN MINES!

Anaconda *uses* shovel cable as well as makes it. The important experience gained from that use and testing of cable under actual field conditions goes into the design and manufacture of the Anaconda Shovel Cable *you* buy.

In Anaconda SH-D Shovel Cable you get cable built to eliminate on-the-job power failures caused by such conditions as sun, jagged rocks, water, kinks, runovers.

The insulation of Anaconda's SH-D Shovel Cable is a special high-grade butyl that withstands ozone, heat and moisture. Patented rubber-cored ground wires help prevent breaks and insulation cutting from kinks and runovers. The neoprene jacket is exceptionally tough and abrasion-resistant. Every design and component has been job-tested—your assurance of superior quality and performance.

Call on the Man from Anaconda with your cable problems. Or see your local Anaconda distributor. For new descriptive Bulletin DM-5818, "Anaconda Securityflex Portable Cables for the Mining Industry," write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. 59213

Anaconda SH-D Shovel Cable at work in an open-pit mine. Continual on-the-job testing of Anaconda designs under the roughest conditions enables us to produce extra long-life shovel cables that prevent power failures from heat, moisture, rugged terrain, kinks and runovers . . . all of this saves you money, assures continued and uninterrupted production.

ASK THE MAN FROM

ANACONDA®

FOR SHOVEL CABLE

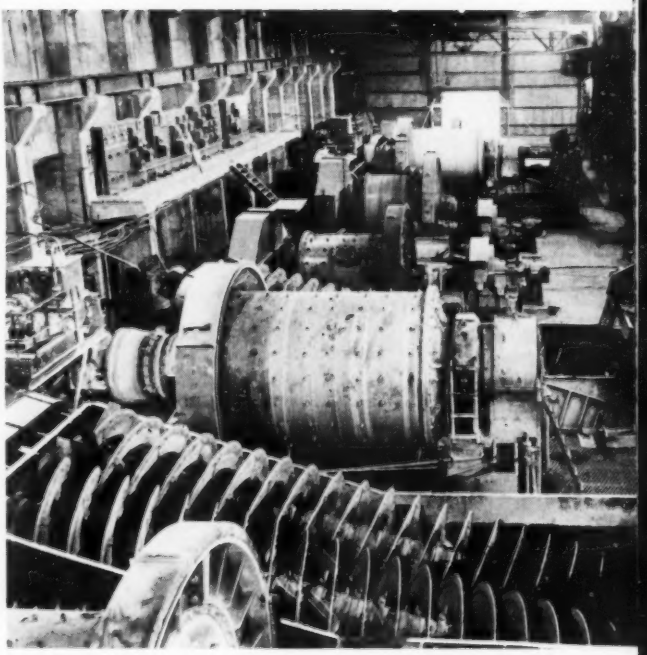
Wherever there's mining ...there are MARCY MILLS and MARCY SERVICE!

IRELAND...

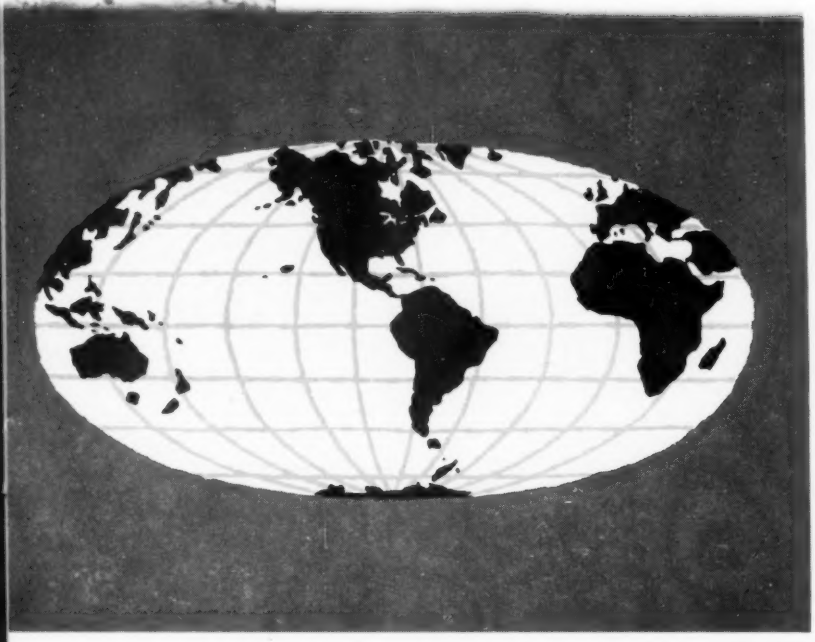
ST. PATRICK'S COPPER MINES

6 MARCY MILLS

St. Patrick's Copper Mines, Ltd., Ireland, has two 9′ x 12′ Marcy Rod Mills and four 9′ x 9′ Marcy Ball Mills. There are two grinding sections, each one having a rod mill in open circuit, discharging to two ball mills in closed circuit with two 72″ Akins Duplex Classifiers. Rod mill feed is minus ½″ and ball mill product is minus 120 mesh. Each section handles 2000 tons per day.

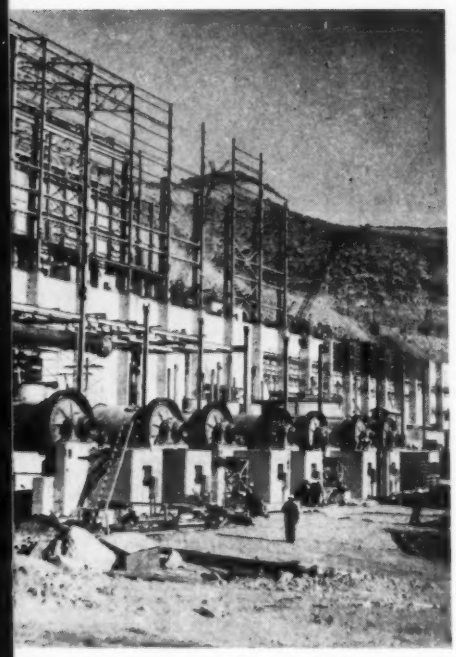


Pegson Limited, Coalville, England, a licensed manufacturer and sales agent for Mine and Smelter, manufactured and serviced the Marcy Mills. The Akins Classifiers were manufactured and serviced by Head Wrightson and Co., Ltd., Stockton-on-Tees, England, also a licensed manufacturer and sales agent for Mine and Smelter.



For Dependable, Low Cost Grinding and Reliable Service Specify

MARCY



PERU...

SOUTHERN PERU COPPER CORPORATION

14 MARCY MILLS

Southern Peru Copper Corporation has seven 10′x14′ Marcy Rod Mills and seven 8′x13′ Marcy Ball Mills. Photo shows the ball mill section during mill construction. Each rod mill is to handle 184 tons per hour of minus 1¼″ feed, grinding to approximately 8 mesh. The ball mills will be used for regrinding concentrates. Each ball mill will be handling 700 tons per day with feed 55% minus 325 mesh, grinding to 85% minus 325 mesh.

South Pacific Industrial Supplies S.A., Lima, Peru, is Mine and Smelter's sales agent in Peru.

Manufacturing Division

MINE AND SMELTER SUPPLY CO.

DENVER 16
3800 RACE STREET

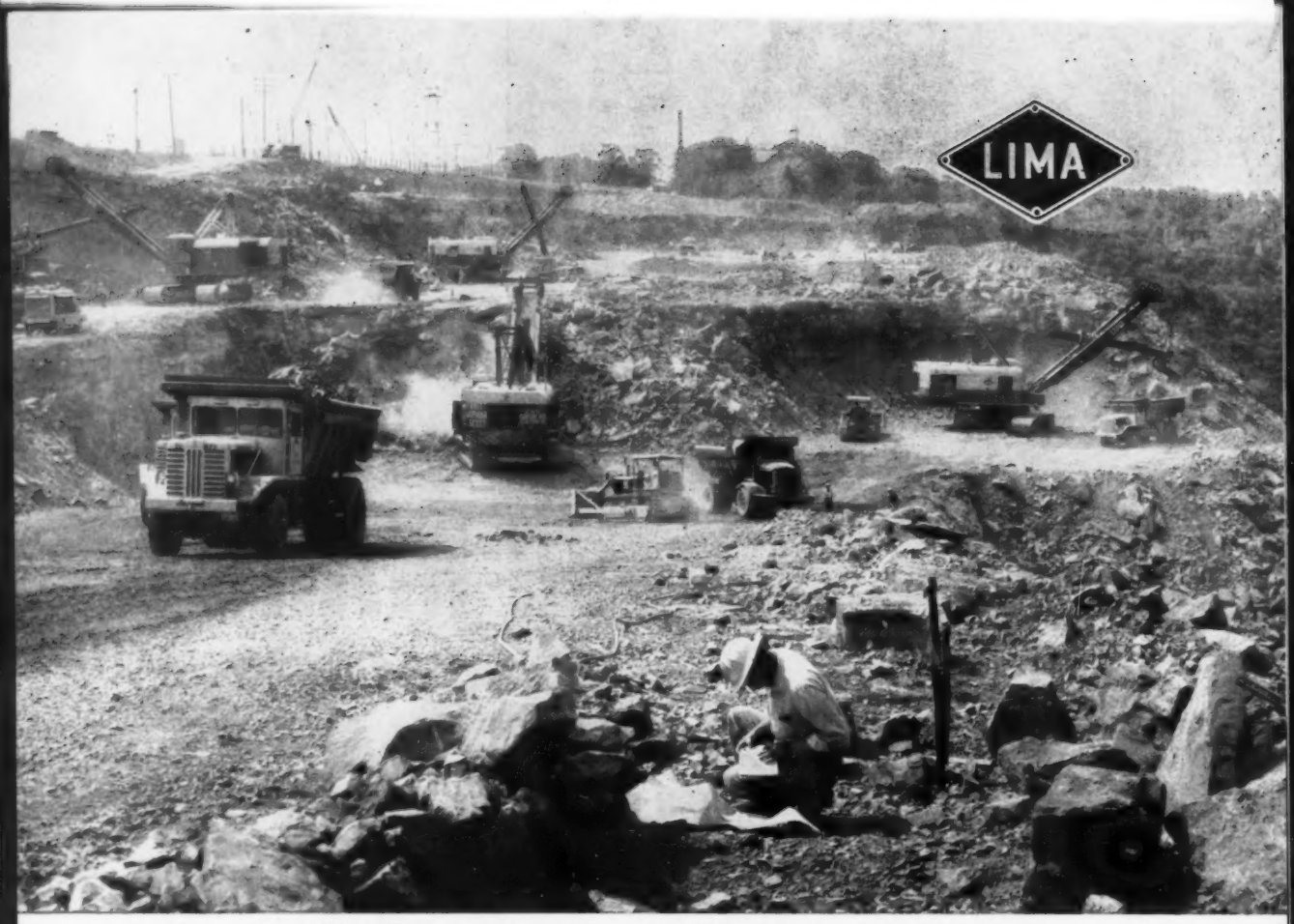
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122 E. 42nd STREET

SALT LAKE CITY 1
121 W. 2nd S.

EL PASO
1515 11th AVE.

LICENSED MANUFACTURERS AND SALES AGENTS in Canada, Australia, Sweden, England, South Africa

SALES AGENTS in Peru, Chile, Philippine Islands, Japan, New York City (for Continental Europe) and in principal cities of the U.S.



Four of Merritt-Chapman & Scott's seven 6-yd. Lima Type 2400 Shovels are shown working on the excavation site of the Niagara Power Project's main generating plant at Lewiston, N. Y.

Four contractors use 17 Limas on giant Niagara Power Project

Wherever there is a really tough job to be done—when high production, dependable heavy-duty service, rugged power, and low operating cost are essential—you are almost certain to find powerful Limas chosen for the task.

The $720,000,000 Niagara Power Project is a big job—one of the biggest. Four of the project's contractors are using a total of 17 high-output Limas on their jobs! The duty roster includes 11 big 2400's which can be used interchangeably as 6-yd. shovels, variable capacity draglines and cranes; one Type 802 50-ton crane; two 4-yd. Type 1601 shovels; one Type 1201 which can be used as a 3½-yd. shovel or 70-ton crane; and two 35-ton 54-T truck cranes.

Around the world, profit-minded contractors know from experience that it pays to buy Limas. They are quality-built throughout to deliver high production at low operating and maintenance costs.

Quality Lima Features

Here are a few examples of the superior features found in the Lima Type 2400—extra strong and rigid rotating base supported by oversize conical rollers in conjunction with double flanged heat-treated roller path and separate hook rollers; horizontal gear train and swing bevel gears are pump-lubricated in oil-tight case; anti-friction bearings are used throughout. Induction hardening of all wearing parts increases life. Crawler bushings are equipped with piston-ring type oil seals. Torque converter adjusts load speed to correspond with the resistance to moving the load—no engine stall.

Limas For Every Job

Profit with Limas—there is a type and size for every job—½ to 6-cu. yd. shovels, cranes to 110 tons crawler-mounted, 70 tons on rubber, variable capacity draglines. Investigate now! Contact your nearby Lima distributor or write us for full details.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

Cable Address: LIMASHOVEL, Lima, Ohio, U.S.A.

LIMA Construction Equipment Division, Lima, Ohio

BALDWIN · LIMA · HAMILTON

5935

LICENSED MANUFACTURERS AND SALES AGENTS in Canada, Australia, Sweden, England, South Africa
SALES AGENTS in Peru, Chile, Philippine Islands, Japan, New York City (for Continental Europe) and in principal cities of the U.S.

MINING WORLD

Zinc Smelter Approved for Eastern Canada

. . . . St. Lawrence Seaway Site Attracts U.S. Company

A major multi-million dollar integrated project for production of refined zinc with utilization of by-products for industrial chemicals and fertilizers is shaping up at Port Maitland, Ontario, Canada. Matthiessen & Hegler Zinc Company has already obtained approval from the Ontario government to build a smelter and refinery, and has awarded contracts for immediate construction of the zinc sulphide roasting plant and sulphuric acid plant. Sherbrooke Metallurgical Company Ltd., a subsidiary of Matthiessen & Hegler, will operate the plants.

The ore roasting plant will use the fluid bed principle under a special license from the New Jersey Zinc Company. The contact sulphuric acid plant will use both the gases from the ore roasting plant and from burning of elemental sulphur. Surplus heat in both the roaster and acid plant installations will be recovered as byproduct steam for use in other parts of the operation. Leonard Construction Company of Chicago has received the engineering and construction contracts. Work starts immediately with completion scheduled for July 1960. Estimated cost, which includes two zinc roaster with an annual capacity of 150,000 tons, is $5,000,000.

Acid from the sulphuric acid plant will be available to supply the growing needs of Ontario, and will be sold to the Electric Reduction Company of Canada Ltd. and its subsidiaries under a long-term agreement. Electric Reduction has announced construction of a large chemical plant at Port Maitland for manufacture of phosphoric acid, superphosphate, and other phosphate chemicals.

The Port Maitland site was selected because of its closeness to the Niagara Gateway through which the majority of Canadian zinc concentrates pass when entering the U.S. or going overseas. It is a deep water harbor on Lake Erie, formed by the entrance of the Grand River into the lake, and is a part of the new St. Lawrence Seaway.

New Experimental Mining Equipment Makes News

• With Anaconda

Anaconda Company is awaiting delivery of what it considers the world's most powerful off-highway truck, driven by four motor wheels of 400-hp. each. Now being tested by R. G. LeTourneau in Longview, Texas, it is destined to haul waste in Anaconda's Berkeley pit at Butte, Montana.

The huge truck measures 42 feet in length (cab and trailer), 14 feet 7 inches in width, and will carry a 60-ton payload. Trailer length is 26 feet 2 inches. Overall weight is 55 tons empty. Its height is apparent from the man standing next to the front right wheel in photo below.

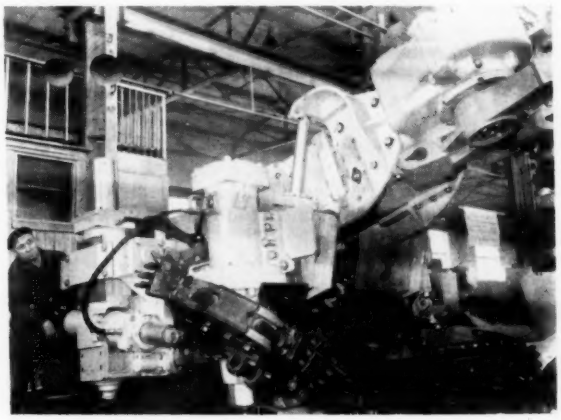
The truck is said to be capable of hauling its load up adverse grade of 15 percent at speeds of 12 to 13 miles per hour. Normally, it will operate from a trolley line during load and return cycles, but is equipped with an auxiliary Diesel engine for power when the truck is maneuvering around the shovel, and at the dump after it is disconnected from the trolley line.

Anaconda officials have high hopes for the truck, and many industry observers feel that the principle may revolutionize open-pit truck haulage.

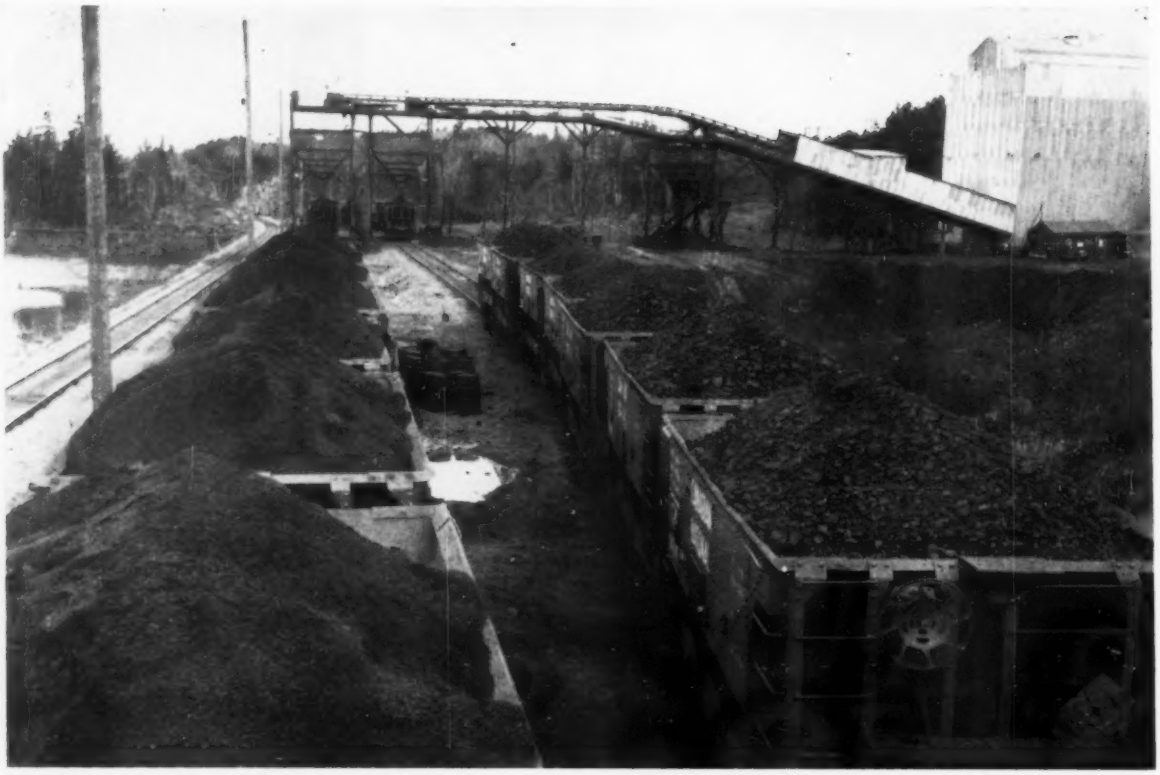
• With the Russians

A model of a new continuous miner said to cut and load huge lumps of coal in seams 2 meters thick (6½ ft) was shown by the USSR at New York's Coliseum June 26 to August 10. Designed to operate in hard anthracite, reportedly this K-26 cutter can handle up to 700 tons daily. Little substantiating data has been provided. It appears to be equipped with upper and lower cutting heads, making it possible to remove remaining central core of the face in large chunks when in operation.





BALDWIN · LIMA · HAMILTON 5935 BLH



TWO NEW GRADES OF IRON ORE are produced by concentration at Steep Rock. Morson Fine grade, in cars at left, is a mixture of jig and spiral concentrate. Morson Coarse, at right, is heavy media concentrate. Both have good handling properties and, when used in a blast furnace the silica, lime, and magnesia, comprise 85 percent of slag. Calculated slag volume is very low at 327 pounds per ton of metal for coarse and 443 pounds for fine. New plants went into operation in 1958.

Steep Rock Iron Mines Concentrates Ore

By W. J. Huston

- **To improve its marketing position in a highly competitive market.**
- **To obtain a better blast furnace feed with a high iron-to-silica ratio and a low slag volume.**
- **To take advantage of low cost underground block caving which then necessitated a cheap method of milling to remove contaminating waste.**

In the 14 years between 1944 and 1959, Steep Rock Iron Mines, Limited shipped approximately 20,000,000 tons of mine run high-grade iron ore to Canadian and United States blast furnaces.

During the last several years it became more and more apparent, however, that Steep Rock would have to improve its product to meet higher standards for furnace feeds. At the same time, the more easily mined open-pit ores were being depleted and expansion of underground mining meant that lower grade ores would of necessity be produced.

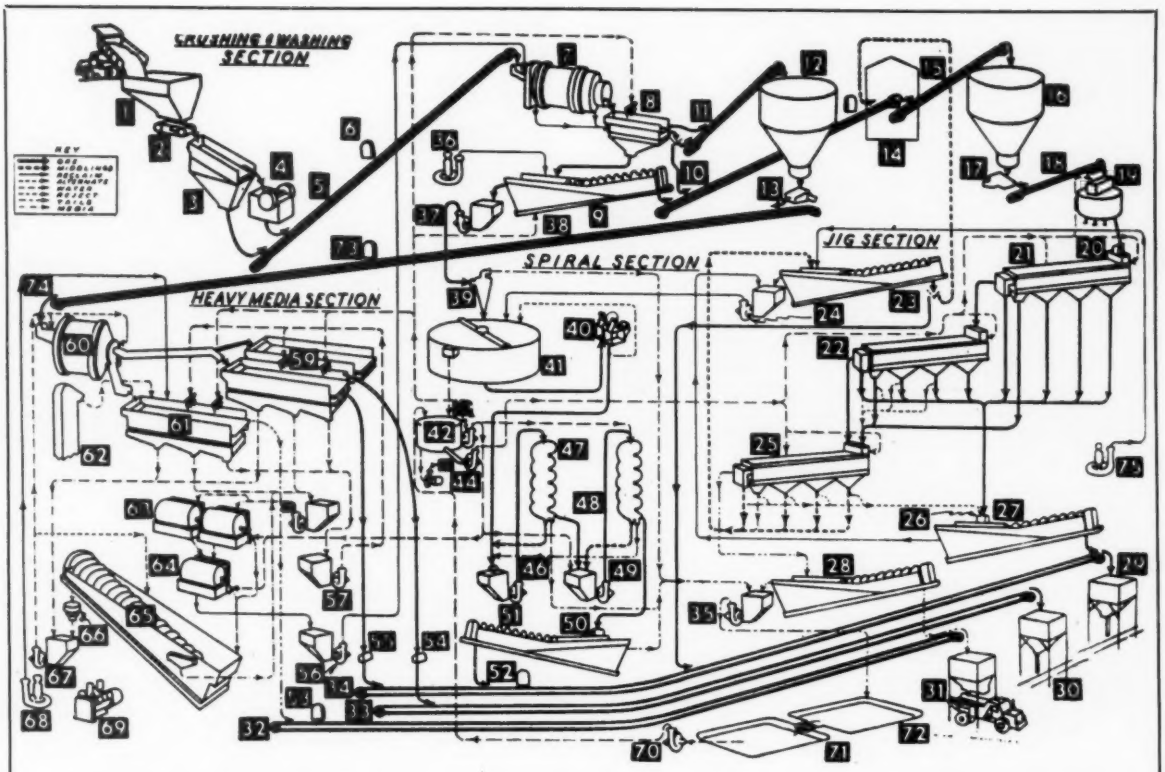
Higher marketing specifications, coupled with low-cost mining, introduced twin problems—to stay in business, the company must produce a higher grade shipping product from a lower grade ore.

Therefore, an ore research program was launched to evaluate the application of ore dressing methods to Steep Rock's low-grade ore. Successful results of this program led to the construction in late 1957 and 1958 of two gravity concentrators, each capable of handling 350 long tons of ore per hour.

Mr. Huston is Chief of Geology & Ore Research for Steep Rock Iron Mines Limited at Steep Rock Lake, Ontario, Canada.

Concentrator Feed

The ore at Steep Rock occurs as almost pure beds of granular to earthy goethite, $HFeO_2$, interbedded with layers of chert and aluminous sediments. Dikes cut the above beds and layers; in the proximity of such dikes, the goethite is replaced by hematite. All the members of the ore zone are in the near-vertical position and dip generally to the southwest. On the footwall side of the ore, a PreCambrian soil is found which averages about 30 percent iron and 3 percent manganese. This material is particularly soft, incompetent, and fine-grained (60 percent minus-200-mesh Tyler scale). On the hanging wall of the ore beds a chloritized volcanic ash



South Concentrator Flowsheet—Steep Rock Iron Mines, Limited—Steep Rock Lake, Canada

Legend

1. Truck ore bin.
2. Pan feeder.
3. Scalping screen.
4. Jaw crusher.
5. Plant feed conveyor.
6. Weightometer.
7. Scrubber.
8. Washing screen.
9. Washing classifier.
10. Conveyor, jig surge bin feed.
11. Bin feed conveyor, HMS
12. Bin, 800-ton.
13. HMS vibrating feed conveyor.
14. Transfer tower.
15. Conveyor, jig surge bin feed transfer.
16. Bin, 800-ton.
17. Vibrating feeder, jig feed.
18. Conveyor, jig feed.
19. Pulp distributor.
20. Jig feed sampler.
21. Rougher jigs, four.
22. Cleaner jigs, four.
23. Dewatering classifier (jig feed).
24. Thickener feed pump.
25. Scavenger jigs, two.
26. Jig concentrate sampler.
27. Classifiers, fines concentrate, two.
28. Tailings classifier.
29. Railroad loading bin, fine concentrate.
30. Railroad loading bin, coarse concentrate.
31. Truck loading bin, tailings.
32. Conveyor, tailings.
33. Conveyor, coarse concentrate, two belts.
34. Conveyor, fines concentrate, two belts.
35. Tailings pump.
36. Vertical clean-up pump, wash plant.
37. Cyclone feed pump.
38. Conveyor, HMS drum separator feed.
39. Cyclones, five.
40. Diaphragm pump.
Jet sizer, 15½ pockets now installed at this point.
41. Thickener, water reclamation.
42. Steady head tank.
43. Pump, plant water supply.
44. Pump, jig plant water supply.
45. Pump, gland water supply.
46. Pump, primary spiral feed.
47. Primary spirals, 24.
48. Secondary spirals, 20.
49. Pump, secondary spiral feed.
50. Sampler, spiral concentrate.
51. Classifier, spiral concentrate.
52. Weightometer.
53. Weightometer.
54. Sampler, coarse concentrate.
55. Sampler, HMS concentrate.
56. Pump, magnetic separator tailings.
57. Pump, counter flow washing.
58. Feed pump, magnetic separator.
59. Screens, sink.
60. Separator, HMS drum.
61. Float product screen.
62. Bucket elevator, (new media).
63. Magnetic separators, primary.
64. Magnetic separators, secondary.
65. Densifier.
66. Demagnetizing coil.
67. Pump, media recirculating.
68. Vertical clean-up pump, HMS section.
69. Air compressor.
70. Pump, clear water.
71. Pump, clear water.
72. Tailings basin.
73. Weightometer.
74. HMS feed sampler.
75. Vertical clean-up pump, jig section.

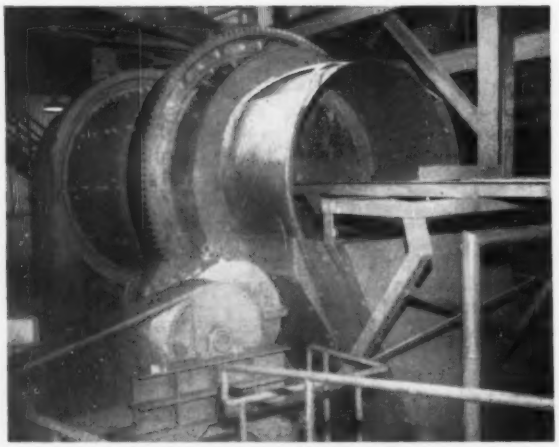
is found which, adjacent to the ore, is extremely soft and talcy. Both rock types contribute to the contamination of the ore and, by so doing, increase the gravity slimes content. Contamination caused by the internal bands of waste does not appreciably affect the size structure of the ore. Table No. I illustrates the change in the structure of the ore caused by wall rock contamination.

The iron content of the mill feed during 1958 ranged between 34 and 54 percent and averaged approximately 50. The silica content averaged approximately 16 percent. The iron in the ore shows a relatively uniform distribution, but generally becomes progressively lower to the fine sizes (see Table No. I). As a result, each size fraction is as important as any other size fraction.

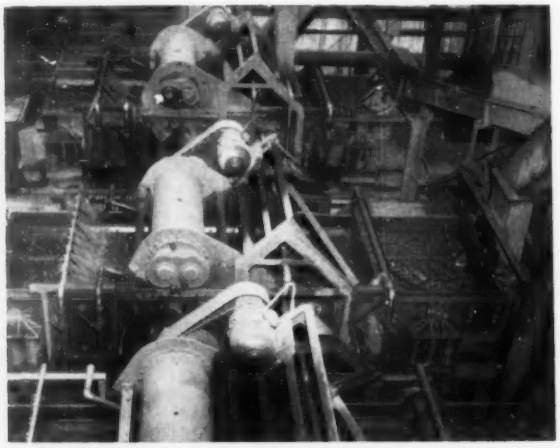
No Middling Problem

From the above description of the ore, it is apparent that true middlings are virtually non-existent. The feed is a product of mechanical mixing of waste rock and high-grade goethite. As a result, no comminution is required for mineral liberation. Crushing to reduce the top size for ease of handling is all that is necessary.

Concentrator feed is reclaimed by shovel and truck from a stockpile capable of holding 500,000 long tons of ore. From this stockpile, it is transported to and introduced into a crushing and feeding system, which reduces the size of the ore to four inches by jaw crusher and feeds it into the mill by pan feeder at the rate of 350 long



SCRUBBING DRUM, with countercurrent water flow, washes and abrades all clay and fine ore particles from ore chunks to give hard clean surface to minimize ferrosilicon loss.



VIBRATING SCREENS, with high pressure wash water sprays, are used to size scrubber discharge and to separate media from both sink and float products.

dry tons per hour. At the North Concentrator, the feed goes directly to the scrubber. At the South Concentrator, however, it travels to a 1,000-ton surge trench, where it is intimately mixed with ore coming from the underground mine and then scraped by slusher into a pan feeder hopper.

At the scrubber, the ore is mixed with 1,200 gallons of water per minute and then tumbled inside the eight-foot-diameter by fourteen-foot drum at 17 revolutions per minute until the clay balls are disintegrated and the ore particles cleaned of slimes. Each piece of ore is exposed to a counter-flow action in the scrubber. That is, the water for the most part flows to the feed end of the scrubber and discharges with most of the fine ore through a plate perforated with ⅝-inch-diameter holes. A small amount of water remains with the balance of the ore and discharges at the other end onto a double-deck screen. Here, the scrubbed material is sprayed with water and sized at ¾-inch. The plus-¾-inch material is conveyed from the screen to a surge hopper for the heavy media mill. The minus-¾-inch fraction joins the minus-⅜ material from the feed end of the scrubber and then enters a wash classifier. The rake product from this classifier is conveyed to a surge hopper for the jig plant and the over-flow product is pumped to the spiral plant.

Table No. I

Change In Structure, Shown By Screen Analysis, of Steep Rock Mines Ore From Expected to Actual

Mesh Size	Uncontaminated Ore (Percent)	Iron (Percent)	Contaminated Ore, Concentrator Feed (Percent)
On ¼-inch	43.5	51.6	22.8
Minus-¼-inch, Plus-60-mesh	35.5	54.8	33.5
Minus-60-mesh, Plus-200-mesh	6.0	49.5	12.3
Minus-200-mesh	15.0	45.7	31.4
Totals	100.0	50.56	100.0

Heavy Media Section

The sink-float section of the concentrator receives ore from its surge hopper by Syntron feeder at a rate between 70 and 105 tons per hour. This ore is concentrated in a 10-by-10-foot Wemco drum in a ferrosilicon medium with a specific gravity of 3.0. At the beginning of the 1958 season, the medium contained 75 percent by weight of 100-mesh ferrosilicon, and 25 percent by weight of 65-mesh ferrosilicon. This ratio reversed and at the close of the season the medium consisted entirely of 65-mesh ferrosilicon. Mixtures of 65-mesh and 48-mesh ferrosilicon will be tested in 1959.

The sink from the drum is discharged onto two 5-by-20-foot, double-deck drain and wash screens where it is cleansed of ferrosilicon and discharged onto a concentrate conveyor. This conveyor removes the ore from the plant to a railroad hopper, from which it is loaded into ore cars. This portion of the concentrate from the mill is marketed as coarse iron ore.

Ferrosilicon removed from the sink and float products is reclaimed, for the most part, by passing the wash water over two primary 30- by 36-inch electro magnets. The reject water from the primary magnets is passed over a secondary 30-by-60-inch Alnico magnet where the balance of the ferrosilicon is recovered. The overflow from this magnet is pumped to the scrubber and used as wash water. A ferrosilicon loss study made between September 26th and October 30th, 1958, showed that the ferrosilicon loss had been reduced to 0.9 pound per ton of heavy media concentrate. During the early operating period, losses of up to 2.0 pounds per ton were recorded, caused by surging of the magnetic separator's feed pump.

Remer Jig Section

Feed for the jig section is discharged from a 900-ton surge bin by a Syntron feeder and conveyed to a distributor. Here, it is proportioned to a system of Wemco Remer jigs consisting of four roughers, four primary scavengers, and two secondary scavengers. The rate of new feed ranges from 100 to 164 long tons per hour and averages about 135. Each jig is five feet wide by sixteen feet long, mounted at approximately a 2½° slope, and equipped with both a low-speed and high-speed motion. The low-speed motion imparts a ⅜-inch stroke at 150 revolutions per minute to the jigs, and the high-speed motion a 1/16-inch stroke at 400 revolutions per minute.

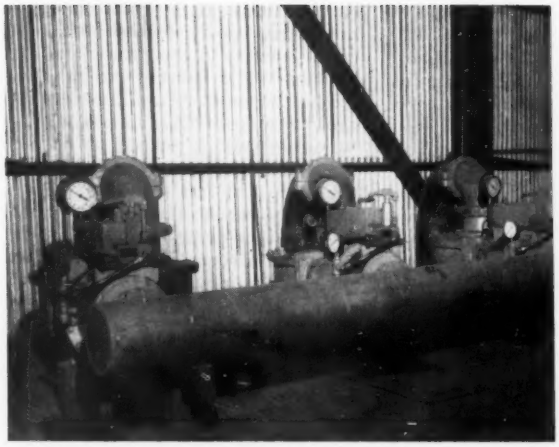
Ragging in the jigs is ¾-inch balls held on a ¾ by 1 inch slotted, punched plate deck. The ore is introduced with

Table No. II

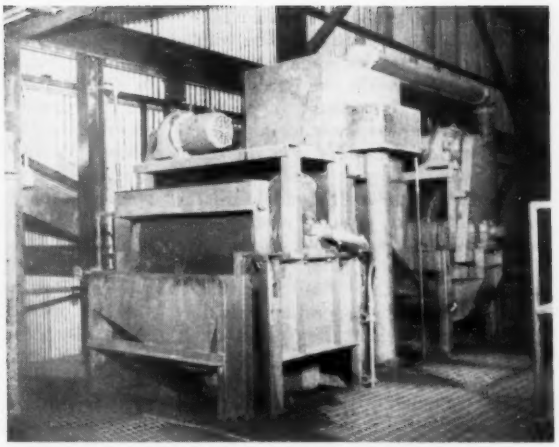
Cost Breakdown for Steep Rock Iron Mines' South Concentrator

Item	Cost
Site preparation	$ 79,000
Foundation	155,000
Structure[1]	587,000
Electric & controls[2]	199,000
Overhead	221,000
Equipment & installation	1,000,000
Sub station	27,000
Fresh water supply	26,000
Railway spur	78,000
Miscellaneous	29,000
TOTAL	$2,401,000

1. 525 Tons. 2. 1,406 Connected Horsepower.



KREBS CYCLONES are used to deslime spiral feed. A 200-mesh separation is made with the overflow discharged to tailings pond. Underflow is spiral feed.



DINGS MAGNETIC SEPARATORS recover ferrosilicon media washed from the sink concentrate and float reject produced by the Wemco drum separator.

approximately 2,000-gallons of water to the four roughers where a large percentage of concentrate is removed. This concentrate is collected from three 1¾-inch-diameter spigots, and the gate, and passed to a concentrate dewatering classifier. The product from the fourth spigot is passed to the final scavenger jig. The tailings are introduced to the first scavengers where another high-grade concentrate is removed. Again, this concentrate is collected from three spigots and the gate and dewatered in a classifier. The product from the fourth spigot joins the tailings and becomes feed for the final scavengers. The two secondary scavengers produce concentrate from the spigots, middling from the gate, and a clean tailing. At present, no bottom water is being used on any of the jigs.

The jig concentrate is combined with the spiral concentrate and marketed as fine iron ore.

The overflow material from the wash classifier is pumped at 20 pounds per square inch to three Krebs two-stage cyclones and deslimed at 200-mesh. The cyclone underflow at 78 percent solids is pumped to a 40-foot thickener, settled, and then fed by diaphragm pump to the rougher spirals pump. The cyclone overflow is discharged to the tailings pond.

The spiral circuit in 1958 consisted of 20 rougher spirals and 10 cleaners. The roughers produce a reject, a rough concentrate, and a middling, which is returned to the feed pump. The cleaners take the rough concentrate for cleaning and, by so doing, produce a final concentrate for shipment, a middling, which is returned as feed to the cleaners, and a tailing which is returned as feed to the roughers.

The rate of new feed to the rougher circuit is 30.8 tons per hour. The total feed rate is 36.4 tons per hour.

Plant Construction Data

The contract for the construction of both the North and South Concentrators was awarded to Western-Knapp Engineering Company of San Francisco, California, who, in turn, engaged The Foundation Company of Canada as sub-contractors. Actual work began in July of 1957 and in January of 1958, on both the North and South Plants, respectively. Both contracts were terminated in July of 1958, at which time the concentrators were turned over to Steep Rock Iron Mines, Limited. The total cost of the project approximated $5,000,000. A breakdown of the costs incurred in the construction of the South Concentrator is shown in Table No. II.

Although two concentrators were constructed and made ready for the 1958 shipping season, only the South one was put into operation because of a marked reduction in the amount of iron ore to be marketed. Operation began in mid-July 1958, and from that time until the end of October of the same year (78 working days) it produced 74,943 tons of coarse concentrate at 59.14 percent dry iron and 5.31 percent silica, and 154,713 tons of fine concentrate at 58.66 percent dry iron and 5.99 percent silica for a total output of 229,656 tons. The grade of the coarse concentrate produced during the first month of operation was 57.68 percent iron and 7.61 silica. For the last month of operation it had improved to 59.93 percent iron and 4.17 silica. The grade of the fine concentrate showed a similar improvement from 58.26 percent iron and 7.46 silica to 58.79 iron and 5.54 silica.

Mechanical Problems

One of the most serious problems encountered in the production of the quarter million tons of concentrate was the extreme wear on pipes, launders, screen decks, and equipment in

Table No. III

Analysis of Jig Feed, Concentrate, and Tailing at Steep Rock Iron Mines' South Concentrator

Mesh Size	Feed	Concentrate		Tailing	
	Weight Percent	Weight Percent	Dry Iron Percent	Weight Percent	Dry Iron Percent
Minus–½–inch, plus–⅜–inch	3.0	—	—	—	—
On 4 mesh	—	0.92	55.1	0.8	13.8
On 10 mesh	—	16.38	60.3	16.6	16.5
On 20 mesh	69.7	32.99	60.2	29.4	20.1
On 40 mesh	—	28.65	59.5	30.7	26.3
On 60 mesh	15.6	13.52	58.2	15.0	34.1
On 80 mesh	—	4.23	59.3	4.7	37.7
On 100 mesh	—	1.58	57.9	1.6	36.9
Minus–100–mesh	—	0.63	60.1	0.4	36.6
On 200 mesh	2.1	1.10	58.7	0.8	31.6
Minus–200–mesh	2.6	—	—	—	—

general. Chute designs and wear materials that give excellent service with pit run ore are not satisfactory for the same material with the cushioning fines removed. As a result, pipes and wear plates were replaced or repaired every four or five days and, in the case of wear plates, a much thicker replacement installed. This acute wear was localized, of course, where ore particles were exposed to a change in direction; and some minor changes in design, to alleviate this condition, were made during operation. Major changes were made at the close of the 1958 season. Chutes and launders were modified and rubber hose substituted for much of the piping. Some rubber was initially installed, but it is quite apparent that the particular type originally used is not satisfactory and experimentation will be required to find a more suitable replacement.

Screen decks were comparatively more enduring, although each was replaced twice during 1958. Again, experimentation will be required to see if screen deck life can be extended.

Metallurgical Results Improve

Once the more aggravating mechanical problems were eliminated and the plant brought into comparatively steady production, a crew of two ore research technicians was established to collect samples from all points in the flowsheet and accumulative pertinent data for the evaluation of the operation. This crew also introduced a sample collection procedure for the operators for daily metallurgical calculations. The results received from these samples used in conjunction with weightometer readings allowed the Ore Research Department to assess the operation of each shift with respect to metallurgical efficiency. The results for each shift were compiled into an average for each week.

A marked change in the concentrator operations was experienced in the last week of September. At the same time, there was a corresponding change in the metallurgy with the result that figures compiled prior to this data were not similar to figures compiled after. Metallurgical results that follow, therefore, relate only to the latter part of the operating season.

During this part of the season, the calculated feed rate to the plant was 340 long dry tons per hour. This figure represents the average for 18 days. Seventy-five tons per hour (22.1 percent) of this material were directed to the heavy media section, 125 tons (36.8 percent) to the jig section, and 140 tons (41.1 percent) to the fines section. Because of insufficient cyclone capacity some of this 140 tons was bypassed to tailings pond. The balance was deslimed from which 30 long dry tons of cyclone underflow was recovered. The unaccounted tailings loss was 110 tons per hour (32.4 percent) of which 23-tons represented plus-200-mesh material.

The changes that were realized were not entirely for the better; although production rates were drastically improved, metallurgical efficiency in some sections of the plant suffered because of overloading. Table No. IV illustrates the metallurgical results obtained for the week October 6th to October 12th (21 shifts) and are compared to expected results and tonnage figures on which the flowsheet was based. These figures clearly illustrate the weak points in the flowsheet and indicate where additional studies are required.

For example, because of severe overloading in the jigs, the jig tailing became much higher and, as shown, reached an average of 28.9 percent iron for the week illustrated. Samples of jig tailing collected for each day show that this iron loss is restricted to the finer fractions of the feed, i.e. the material that should be hutched. Nine samples of jig tailing when screened and assayed gave the results shown in Table No. III. Also shown are the results of 10 jig concentrate samples collected at the same time. These jig products were derived from feed material that gave the size analysis shown in the same table.

Both sets of figures substantiate the belief that, if the fines were given additional treatment, the iron loss in the jig tailing would decrease, whereas the grade of concentrate produced would remain as good as shown. To provide this better treatment, the rate or grade of feed must be decreased or the jigs adjusted to cope with the excess iron being introduced.

By far the most overworked section of the concentrator was the cyclone-spiral section because, in place of the 1,100 gallons per minute expected as wash classifier overflow, approximately 2,200 gallons were realized with about the same solids content. This slurry had the following size analysis: minus-20-mesh, plus-40-mesh, 6.0 percent by weight; on 60 mesh, 7.9 by weight; on 200 mesh, 23.0 by weight; and minus-200-mesh, 63.1 by weight.

As was reported, some of this slurry was by-passed directly to tailings pond, and only the balance deslimed in the cyclones. For 12 days during

Table No. IV
Comparison of Actual to Expected Results at Steep Rock Iron Mines' South Concentrator for Week of October 6 to 12, 1958

	Expected	*Iron Unit Distribution*[1]	*Actual*	*Iron Unit Distribution*[1]
Plant feed rate[2]	350		359	
Iron (dry) content	35–40–45	100	51.4	100
Plant conc. rate	177		189	
Iron content	58	73.4	59.5	61.0
Plant tail rate	173		170	
Iron content	21.5	26.6	40.8	39.0
H.M.S. feed rate	150		80	
Iron content	40	100	51.6	100
H.M.S. conc. rate	84		66	
Iron content	58	81.2	59.5	95.0
H.M.S. tail rate	66		14	
Iron content	17	18.8	15.4	5.0
Jig feed rate	124		131	
Iron content	43	100	54.8	100
Jig conc. rate	81		110	
Iron content	58	88	59.7	91.6
Jig tail rate	43		21	
Iron content	15	12	28.9	8.4
Spiral feed rate	28		32	
Iron content	40	100	49.5	100
Spiral conc. rate	16		13	
Iron content	58	82.8	58.5	48.0
Spiral tail rate	12		19	
Iron content	15	17.2	43.1	52.0
Cyclone feed rate	1,100 GPM @ 24 percent solids		2,181 GPM @ 25.1 solids	
Cyclone under flow rate	28 tph[2] @ 70 percent solids		32 tph[2] @ 78 percent solids	
Pump tail rate (Not spirals tails)	55	13.1 percent	116	28.8 percent
Loss of theoretical recoverable iron units		13.5 percent		10.2 percent

1. Percent. 2. Rates in dry tons per hour.

October, the portion deslimed separated into an underflow that contained 78 percent of (by weight) plus-200-mesh material with a solids content of 78 percent and an overflow that contained 92 percent by weight of minus-200-mesh material. Near the end of the study in October, the minus-200-mesh material in the overflow amounted to 99.5 percent by weight.

The thickener underflow for the same period of time had a solids content of only 24 percent. This was mixed with spiral middlings and fed at a pulp rate of 22.4 gallons per minute to the rougher spirals. The total feed to the rougher spirals had a solids content of 28 percent by weight. The cleaner spirals were fed with a slurry containing 32.5 percent solids by weight at a rate of 12.9 gallons per minute. As was apparent in Table No. IV, however, the spirals as set could not cope with this feed; and although the grade of concentrate was entirely satisfactory, the iron recovery was not.

Additions for Fine Ore

The iron ore concentration program for 1958 at Steep Rock was generally successful and supplied an excellent product for marketing. The desired efficiency was not attained, however; and immediate improvements in certain phases of the flowsheet were necessary for the beginning of the 1959 season.

As a result of investigations by the Ore Research Department during the winter months, several additions and modifications were made to the South Concentrator flowsheet to increase capacity and improve recovery.

Sized Concentrate Analysis in Percent, Steep Rock Iron Mines Limited, October 1958

Constituent	Coarse Ore (Plus-¼-inch)	Fine Ore
Iron (dry)	59.93	58.79
Silica	4.17	5.54
Sulphur	0.045	0.045
Manganese	0.23	0.29
Alumina	0.92	1.13
Phosphorus	0.026	0.026
Moisture	4.99	8.19
Ratio, iron to silica	14.4:1.0	10.6:1.0

Cycloning capacity was increased to handle 185 long tons per hour by the addition of two Krebs two-stage cyclones to provide a total of five-in-line units.

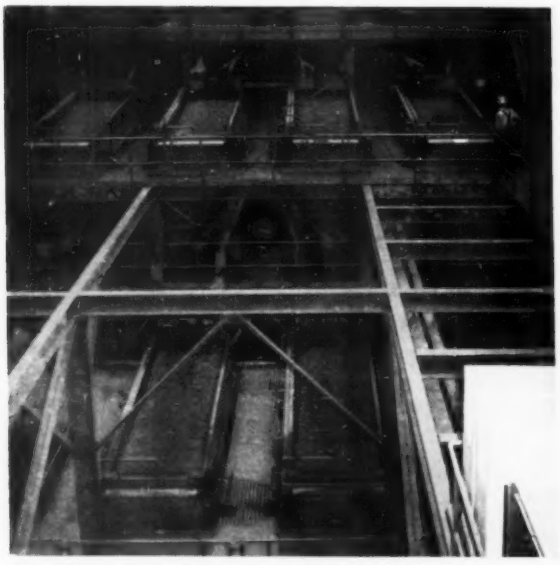
A 15½ pocket Dorrco jet sizer has been installed. The feed for this unit will be the 84 long tons per hour of cyclone underflow which previously discharged into the 40-foot thickener. This thickener will be used exclusively for water reclamation. The jet sizer will produce three products, a concentrate, a spiral feed, and a tailing. The concentrate will consist of the plus-80-mesh portion of the feed, grade 57 percent. Fe. and recover 49 percent of the iron units in the feed. The spiral feed will comprise the minus-80-mesh, plus-200-mesh portion of the feed plus the gangue rejected by the concentrate producing pockets. The expected spiral feed will grade 45 percent Fe, recover 42 percent of the iron units in the feed and provide 38 long tons per hour of feed for the spiral section. The jet sizer will reject 12 long tons per hour of tailing containing 9 percent of the iron units in the feed and will essentially be the minus-200-mesh portion of the feed plus the gangue reject from the spiral feed producing pockets.

Spiral tests indicated additional spiral capacity was required to effectively handle the feed tonnage and size range of the jet sizer product. The spiral circuit was, therefore, enlarged to 24-rougher units and 20 cleaner units. The iron unit recovery of this spiral circuit, based on test unit studies, will be 70 percent and the concentrate will grade 57.5 percent Fe.

The most challenging part of the flowsheet involves that fraction of the ore that is minus-200-mesh in size. Losses are considerable in this size range, and it is imperative that some process be applied to recover this lost iron. As usual, the choice is limited and, perhaps, restricted to only flotation or roasting and magnetic concentration. A flotation study has been in progress for approximately a year at Steep Rock, but no suggestions are forthcoming as yet. The hope is, however, that sufficient data will have been compiled by the end of 1959 so that decisions can be made for 1960 and 1961.

The program, of course, is only partially complete at the recovery stage, and a great deal of work must be done to transform the fine ore into a product acceptable on the market. This phase of the program has already been launched and will cover methods of agglomerating including sintering.

END



WEMCO REMER JIGS, four roughers at top, four primary scavengers in center, and two secondary scavengers at bottom recover 91.6 percent iron in jig feed in a 59.7 percent concentrate.



HUMPHREYS SPIRALS produce three products: a final concentrate for shipment, a middling for retreatment, and a tailing. In 1958 feed assayed 49.5 percent iron and concentrate 58.5.



NEW BLASTING MIX is more sensitive and provides a much denser blasting agent than is obtained by more conventional method of soaking ammonium nitrate prills with Diesel oil. Increased density makes it possible to blast harder rock; same sensitivity could be obtained by adding TNT to the prills, but it costs 14 times as much as molasses.

A-N Prills Are Soaked with Molasses

By C. J. Houck

There have been many articles written on the use of ammonium nitrate as a blasting agent. Improvements have been made at many different properties, including Anaconda's Weed Heights mine. However, we find the study of this subject to be far from having been exhausted.

This is the third article Mining World has published on how Anaconda cut blasting costs with ammonium nitrate at Weed Heights, Nevada. The first two articles in August and December 1956 issues described how blasting costs had been cut $5.19 per hole.

A. E. Millar, general manager at Weed Heights, is always looking for ideas and methods to cut costs and has released full information on Anaconda's blasting experience so that the industry can profit. This third article will provoke a lot of interest in blasting and Mr. Millar and the Editor hope that every open-pit manager will write to Mining World *outlining new ideas and new developments which can be used by all to cut costs and produce more metal.*

The use of ammonium nitrate prills with Diesel fuel oil is standard practice in many open pits today, but we, together with others, fully realize that there are certain limitations to the use of this mixture. We fully recognize that this mixture is a fairly satisfactory one; however, we have continued considerable experimentation as it is still our desire to obtain a mixture which might have a more suitable sensitivity and be of a proper density.

The present ammonium nitrate prills-oil mixture does not have sufficient density to permit breaking of hard rock. Recently some slurries have been developed providing greater density and a more suitable blasting agent. Such slurries, used at present, incorporate from 20 to 25 percent TNT. These definitely have proved themselves to be very suitable and advantageous, but the addition of TNT definitely increases the cost of the blasting agent and also requires time for proper mixing.

Carbon's Key Role

The purpose of adding TNT is twofold, namely, to add carbon and at the same time increase sensitivity. With this in mind we have been making certain investigations which would lead us to believe that if carbon can be introduced properly into the slurry we would then have a workable sensitivity without the addition of TNT. In other words, the use of a hydrocarbon in a water solution or emulsion should prove an acceptable method of getting carbon into intimate contact with the particles of ammonium nitrate, thus producing an acceptable slurry.

From our experimentation we found that three materials, when mixed with five or ten pound batches of ammonium nitrate, gave satisfactory results.

The first of these materials with which we experimented was lignon sulfonate (Orzan) and water. By mak-



AUTHOR is mine superintendent for The Anaconda Company's open pit copper mine in Nevada.



ORE IS BROKEN from 25-foot benches at the mine. Holes are drilled 30 feet deep by rotary drills with 7⅞ inch bits.



SEARCH FOR OTHER METHODS of introducing carbon to the blasting agent led investigators at The Anaconda Company to examine water-soluble or emulsified hydrocarbons. Mine produces 12,000 tons per day.

To Improve Blasting at Weed Heights

ing this mix on about an equal volume basis and by pouring this mixture into the bag of prills, we produced a slurry which yielded only fair results. Upon blasting we always produced yellow nitrous fumes which definitely give indication of poor detonation. By increasing the quantity of lignon sulfonate we found that the slurry decreased in sensitivity—several holes failed to detonate.

The second material was a mixture of emulsified asphalt and water, about equal volumes. This mixture was very bothersome insofar as handling is concerned and we found that this mixture did not penetrate the prills properly. In other words we found that excess water had to be added in order to obtain even and rapid penetration of the prills.

Molasses Tests Favorable

Carrying our experimentation further we found that a mixture of molasses and water, again on an equal volume basis, would penetrate the prills uniformly, and in our testing so far this slurry has given consistently satisfactory results.

We are continuing our testing, especially using the molasses mixture, and we believe that this mixture will prove to be the most efficient, producing the sensitivity and density required.

Our practice, so far, with this molasses mix is as follows: We make a mixture of 1½ gallons of water with 1½ gallons of molasses. They mix quite readily. This is then added to an 80-pound bag of prills, and penetration is found to be rapid, even, and very effective, making a very workable slurry. An 80-pound bag of prills is fully penetrated in about 20 minutes and the resulting slurry can be poured into the blast holes.

Loading Density Increased

We have carried on considerable testing with this slurry in our blast holes which have a diameter of 7⅞ inches. All holes are primed with Titan 150 booster, which is our regular booster for priming when using oiled prills. In our blast holes we have learned that an 80-pound bag of oiled prills rises 5.4 feet. This compares to a rise of only 3.7 feet when using the molasses slurry. This increase in density is certainly very desirable for blasting in hard rock.

The molasses used in our experiments is a feed grade having the following composition: Total sugar, 48.00 percent; other carbohydrates, 12.19; crude protein, 4.81; mineral, 12.44; and water, 22.56.

The cost of this type of molasses delivered at Weed Heights is $31.08 per short ton. A gallon of molasses weighs 12 pounds and from these figures we calculate that the cost of the molasses slurry per 80-pound bag of prills is about $0.28. This is considerably cheaper than the addition of 20 or 25 percent TNT which would cost in the neighborhood of $4.00. We are experimenting further, using this molasses slurry, by placing it in polyethylene bags. By simply tying the ends of the bags and loading in holes, we have so far been able to obtain good detonation even in wet holes.

We are not offering this brief report as the final word in ammonium nitrate blasting. Inasmuch as we carried on considerable original experimentation with ammonium nitrate, however, we would like to pass these new ideas on to the industry in the hope that our results may be of benefit to others. We hope, too, other companies making experiments may be willing to pass along any new discoveries.

There are many cheap hydrocarbons available which to our mind can be emulsified. We certainly look forword with interest to any new development or any new approach in the use of this blasting agent which already has resulted in greatly decreased blasting costs during the past few years. END

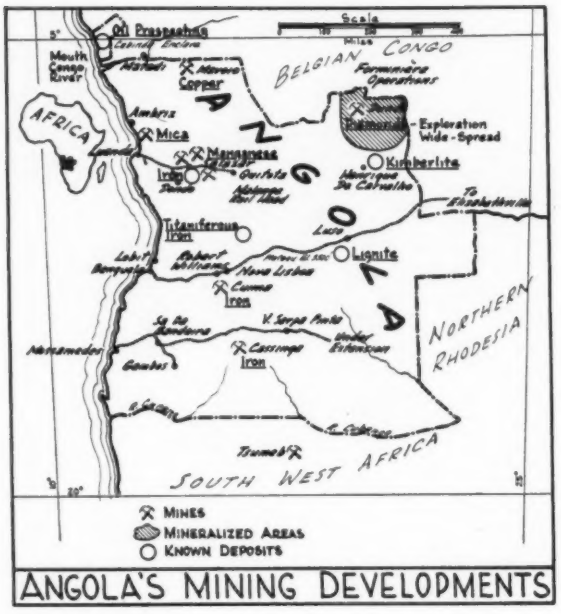
Angola—

A Special MINING WORLD Correspondent Makes His First Report On This Little Known African Country Where He Found:

Study Important Iron Mining Projects

Vast Areas Only Partially Prospected

To Start Large Scale Geological Mapping



ANGOLA'S MINING DEVELOPMENTS

Angola provides a good base from which to start an African mining survey. The deep-water Atlantic Coast harbor of Lobito forms the natural gateway to Belgian Congo's Katanga and Northern Rhodesia; and, as a mining country, it is at the beginning of things itself—with mines no deeper than the alluvium. Mineral development has lagged behind. A great hinterland calls for exploration, for this "province" of Portugal is over twice the size of Spain and Portugal combined.

The coastal belt has surged ahead on the profits of a post-war boom. The seaports, Luanada, Lobito, Benguela, and Mossamedes, have grown on modern lines beyond recognition and their docks have been gradually re-equipped. Near the coast are two cement plants.

Government "Five Year Plans" show ambition. $160,000,000 worth of work is scheduled for 1959 to 1964, with highways and railroad extensions to the fore. Of this, $10,000,000 is granted for mapping, geology, and mines. The multi-million dollar Cambande dam and power station, already started is intended to serve an aluminum industry at Dondo, under continental technical control; another Volta scheme. Bauxite has not been found and probably ore would be shipped from French Guinea, if the scheme matures. The power plant will come, but the aluminum can only be a distant aim.

Diamonds Lead Mining

The Diamond Company of Angola (DIAMANG), producing in the northeasternmost section, stands above comparison. Accounting for over 80 percent of the country's mineral yield, it enjoys a prosperity unmenaced by synthetic stones. Cooperation with government and the Belgian firm, Forminière, north across the border in the Congo, has led to a firm check on thefts and smuggling—a sure sign of good administration wherever alluvial diamonds are found. West African states would find much to emulate.

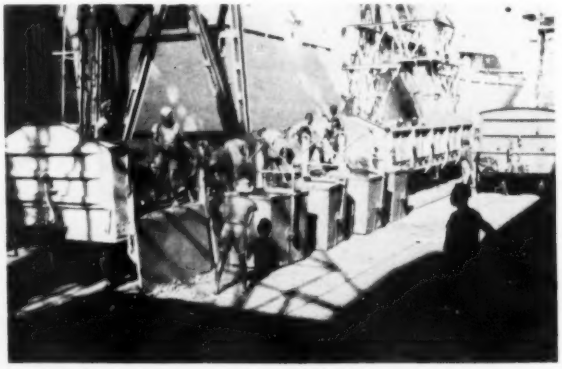
The rapid development of the Angola and Congo diggings soon after World War I caused consternation in Kimberley and Hatton Garden until Sir Ernest Oppenheimer applied his genius to the system of cooperative marketing which has been uniquely successful among internation organizations.

Angola's annual production of diamonds exceeds 1,000,000 carats. With 60 percent gem stones, the average value is remarkably high at $20.00 per carat. The scale of operations in



MANGANESE MINE at Quitota, east of Luanda, where ore is carefully mined and sorted by hand before shipment. Senora Louise Berman photograph.

MINING WORLD Photograph



LOADING manganese ore from Belgian Congo aboard cargo ship at Lobito harbor. A new mechanical loading system will be commissioned shortly.

the field is impressive. Roughly an annual 10,000,000 cubic meters of overburden are removed—mechanically, hydraulically, or manually—to mine 2,500,000 of gravel.

For concentration, old-type fixed 8-foot rotary pans predominate, but a sink-and-float separation unit, of large capacity, has been so successful as to call for duplication. Numerous occurrences of diamondiferous Kimberlite (complete with chrome diopside) have been found, though the last reported happens to be barren. Underground mining will come some day to the diamond fields of both Angola and the Congo.

Outside the diamond world, only two entities figure prominently in the mining news, namely, Senor Sousa Machado, controlling Cia Mineira do Lobito, and Senora Louise Berman, controlling Cia do Manganes de Angola. Iron and manganese, respectively, are their chief but not their only interests.

Interest is particularly great when Senor Machado visits Lisbon for discussions with government and continental steel concerns. Mining expansion could be just ahead as a result of any of these talks.

Credit Is Due

Credit is due Senora Berman when she decides to have no truck with tardy buyers and cheerfully stockpiles manganese in readiness for a brighter day.

Mineira's iron ore deposits are at Quima and Cassinga. Quima lies 35 miles south of Robert Williams on the Benguela Railroad, 240 miles from Lobito port. Last year it was producing hematite at the rate of about 20,000 tons a month from shallow workings. Mechanical sizing with some concentration was introduced six months ago by an Allis-Chalmers screening and washing plant of 100-ton hourly capacity. Stockpiles have grown. Only 30,000 tons of iron ore were exported to Germany and France from Angola during the first quarter of 1959. The ore assays about 64 percent Fe, and is low in silica.

Iron Expansion Ahead

All of this sounds very small compared with the future projects at Cassinga, where vast resources of banded taconite iron stone, at about 37 percent Fe, plus high grade segregations, are expected to be proved. Lisbon negotiations are reported to cover large-scale operation with a crushing and concentration plant, branch line to rail (60 miles), partial re-equipment of existing railroad to Mossamedes port, special loading facilities, and a waterpower installation. An ambitious scheme, calling for a difficult integration of diverse interests. Mineira, with headquarters at Nova Lisboa under Senor Engenheiro Sampoio Nunes and United States mining geologist Louis W. Ferguson, is to be commended for building up a sound technical organization during difficult times.

The Angola Manganese Company's properties, around Quitota, near rail 200 miles east of Luanda, cover a scattered group of fairly shallow deposits of good grade which do not require concentration. Scores of open pits have contributed to production, which has been around 50,000 tons per year. In the first quarter of 1959, only 5,300 tons were shipped—to Norway, Germany, and Holland. Given a good market and improved railroad facilities, these mines might be made to do something big by local standards.

The copper miners, working rich veins at Mavoio in the north, have been smelting or shipping high grade ore for a total annual revenue of $1,000,000. They have shown enterprise in exploration and deserved better luck. Some new discovery is necessary to give Angola anything big in copper. I think the Swedish Boliden Company, whose geologists have visited the country, would agree to that.

Mica ($150,000) is produced from small pegmatite workings northeast of Luanda. Gold, vanadium, and lead barely find a place upon the output list. Lignite, 50 miles from rail in the east, may come in some day, but wood fuel continues to serve the Benguela Railroad more economically because of its forest rights.

Mineral Study Started

Angola is commonly diffident about approaching foreign capital. National influences lead to emphasis on home control. Actually, however, the Belgians hold control in the new setup for Luanda petroleum. Gulf Oil Company controls the Cabinda oil prospecting venture, in the Cabinda Enclave to the north, with fifty-fifty profit sharing if success is gained. The Danes, in cement, run the concern with a minority interest.

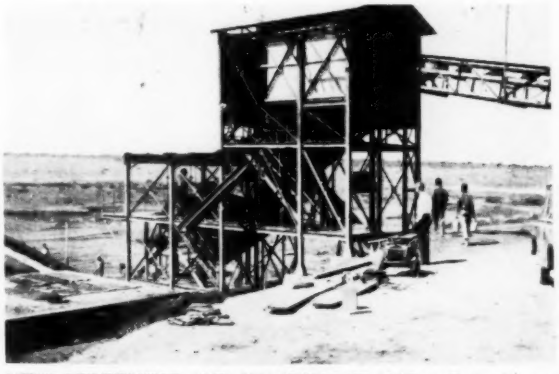
Undue secrecy surrounds Angola's ore deposits. Nowhere in government or academic papers can any geologically descriptive reports be found. The efficient geology and mines department, now imposingly housed in Luanda's new Marine Parade—a hopeful sign—has a difficult task. Rightly, geological survey and mapping has been put first and, no doubt, the fiscal problems presented by the country's 240 mining and exploration concessions creates a heavy burden. None the less, and on high priority, the character and prospects of all significant mineral deposits call for study and report.

The country may have much to gain, and certainly has nothing to lose, by seeking to be better known in the mining world. END



EUCLID TRUCK hauls overburden from Quima iron ore deposit of Cia Mineira do Lobito. Engineer Sampaio Nunes and United States geologist Louis W. Ferguson in center.

MINING WORLD Photograph



NEW SCREENING AND WASHING PLANT at Quima's iron ore mines near Nova Lisboa. This plant produces a high grade concentrate from surface ores.

903 Days . . .

No Lost-time Accidents



THIS RECORD is outstanding and brought recognition to Silver Bow, Montana plant.

How Victor Won A National Safety Award . . . Drills

A good safety record is considered as important as the production record at all of the mines and plants of Victor Chemical Works. According to Floyd B. McCoy, general superintendent of the mining operations and furnace plants, "We realize that it is far better to spend time to prevent accidents than it is to lose time because of injuries that are both costly and painful to the employee."

Victor operates eight plants across the nation, and at three, it produces its basic raw material, elemental phosphorus. These electric furnace plants operate 24 hours a day, seven days a week. So safety is actually a full-time job.

The editors of MINING WORLD suggested that Victor point out some of the unique safety practices which enabled the plant at Silver Bow, Montana to win the Joseph A. Holmes award with an enviable record of over 903 days as of September 29, 1958 without a disabling injury.

From Henry F. Johnson, superintendent of the plant and the company's Montana mining operations, to the last employee hired, SAFETY is the watchword of each working hour.

Suppose you, the reader, imagine yourself as a new Victor employee. Let's assume you are reporting for your first day of work.

After the usual preliminaries to obtain a complete personal record, you receive a thorough physical examination. Next, you meet with your immediate supervisor and the plant safety director, C. A. Trenary, who indoctrinate you with the company's entire safety program. This includes an actual visit through the area of the plant where you will be working. You notice *every* employee wears a hard safety helmet. Some are white, others green, yellow, red, or blue. This color scheme identifies them as supervisors, foremen, electricians, welders, production operators, or skilled laborers.

Next, you notice the plentiful supply of brightly marked emergency showers, almost everywhere you look. Every employee wears safety goggles, gloves where necessary, special clothing in certain areas, and almost everyone has safety shoes that are supplied to the employee at cost.

Safety posters are in evidence at logical locations, but one in particular which attracts your attention reads:

SAFETY! ALL THIS IS NO ACCIDENT! AS OF SEPTEMBER 29, OVER 1,193,485 MAN HOURS WITHOUT A LOST-



ACCIDENT PREVENTION is better than time lost for injuries says Floyd B. McCoy as he presents certificate to Silver Bow superintendent Henry F. Johnson.



SIGN SMACKS worker in eyes as a constant reminder to protect his sight while working at grinding wheel where one of the commonest occupational hazards exists.



SAFETY FIRST BEGINS at plant entrance with this reminder.



DRIVERS HEADING HOME are warned by this sign at exit.

. . . Daily Talks . . . . Weekly Inspections

TIME ACCIDENT CAN ONLY BE POSSIBLE WHEN *EVERYBODY* IS CAREFUL.

So, after spending most of the day on safety, you may think, "that's it." But, no, when you report for work the next morning, your foreman meets you and for the next five minutes he explains the particular safety rule being stressed that shift. After you commence work at your job, you notice that he discusses the same point with every other man in his department, and you learn that this happens *every day*. Sometimes your foreman talks to the department as a group, but most of the time to each of you personally. You soon learn that he believes in and means what he says. You also are impressed when you find out that he sends a brief, written report of his safety discussion to his supervisor every day.

Within a few days you become aware of another unusual safety measure. You may, without thinking, start working without your safety helmet and the next thing you know another workman, not your foreman, taps you on the shoulder and says, "Let's get with the helmet, Bub."

Before you've had a pay day, you learn that there is a plant inspection every week. This is unannounced and not on the same day or at the same time each week. The plant superintendent and safety director make this inspection, and if they find anyone guilty of being without the proper safety equipment, you're glad you are not the foreman of that department.

Another thing which impresses you is the weekly shift "fire drill." Every area in the plant has a designated signal, and certain employees have an assigned responsibility in case of fire. The siren screeches an alarm that spells out the location of a "possible" fire. The appointed fire crew rushes immediately to the nearest fire station, unreels the hose, and goes to the exact location of that "possible" fire. Unless you are a member of the fire crew, you remain at your post to secure equipment which may be affected by the fire. It seems a little farfetched to you, but then you remember once seeing someone who was badly burned and you know that what you are doing and seeing may someday save several lives, maybe yours. And from that day on, you become a booster for the company's safety program.

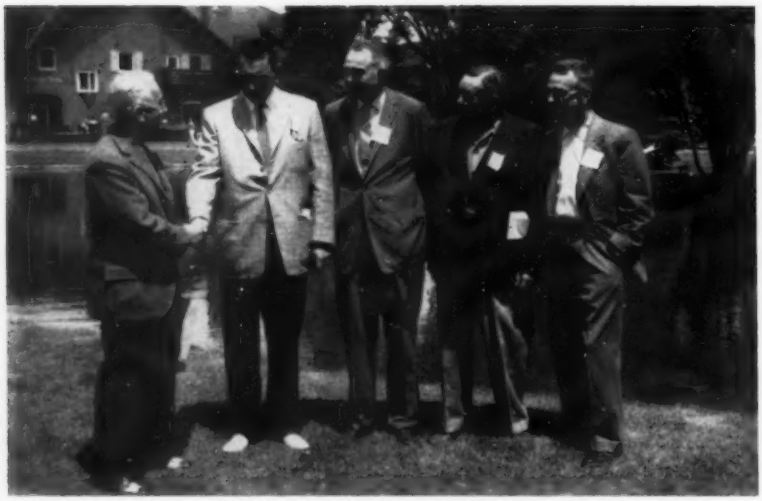
END



AT RAILROAD SPUR graphic aid warns men of hazards encountered by stepping between cars. New employees spend first day on job undergoing safety indoctrination.



SIGNS SAVE LIVES at Silver Bow plant. Biggest advantage to intensive safety program is that the same men are on the job every day; nobody misses a shift due to job injury.



RETIRING PRESIDENT Wallace Woolf (far left) of the Idaho Mining Association shakes hands with president elect L. J. Randall. Looking on are J. C. Kieffer, first vice president, Harry Marsh, second vice president, and A. J. Teske, secretary.



NATIONAL LEAD-ZINC COMMITTEE'S work in Washington, D.C. is described by Charles Schwab, chairman,

Plug the Loop-Holes in Import Quotas

Convention Speakers Predict . . . . . Price increase for zinc soon, Strong growth for phosphate mining, And more emphasis on state's rare metals

"Import quotas on lead and zinc can do the job for which the Administration designed them," according to Charles S. Schwab, chairman, Emergency Lead Zinc Committee. However, he advised the Idaho Mining Association convention at Sun Valley on July 6 that several changes were necessary to achieve the goals of the "woefully inadequate quotas in effect today."

To be effective, the lessons from nine months' experience have proved that (1) quotas must be flexible; (2) the present loop holes on semi- and manufactured lead and zinc must be plugged; and (3) a higher combined price for lead and zinc must be a result.

He warned, however, that it would be most difficult to have either Congress or the Executive Branch of the Federal government make any of these needed changes. He added that no matter what the difficulties are the industry must never give up its fight in Washington.

He forecast a modest increase in both lead and zinc prices before the end of 1959, barring a steel strike. Zinc, he said, is in a better position for a price increase than is lead.

Wallace G. Woolf, vice president, Bunker Hill Company, and president of the Idaho Mining Association, confirmed the importance of quotas. He said that while the industry must strive for solutions it must think in terms of tariffs and/or quotas as the only way to restore a vigorous life to the domestic mining economy.

Lead and zinc have the peculiar distinction of being the only commodities that have ever had two favorable reports for relief by the United States Tariff Commission. However, Mr. Schwab reported, in view of the inadequate results from Tariff Commission recommendations, other metals have taken a dim view of going the tariff route for relief.

In a special question and answer session, Mr. Schwab and Robert W. Redwine, Counsel for the United States Senate's Interior and Insular Affairs Committee, answered the following questions.

QUESTION by Henry Day, president, Day Mines, Inc, Wallace Idaho. "Will it be possible for industry to return to Tariff Commission for further relief after October 1?"

ANSWER by Charles Schwab. "No. Industry can't initiate because under proclamation on Section 7 the Commission can't reopen petition."

ANSWER by Robert Redwine. "The chairman and chief counsel for the Tariff Commission have advised the Senate Interior and Insular Affairs Committee that the Commission cannot entertain an Escape Clause petition."

QUESTION by Mr. Day. "Will there be hearings before Congressional committees on Bills for increased quotas?"

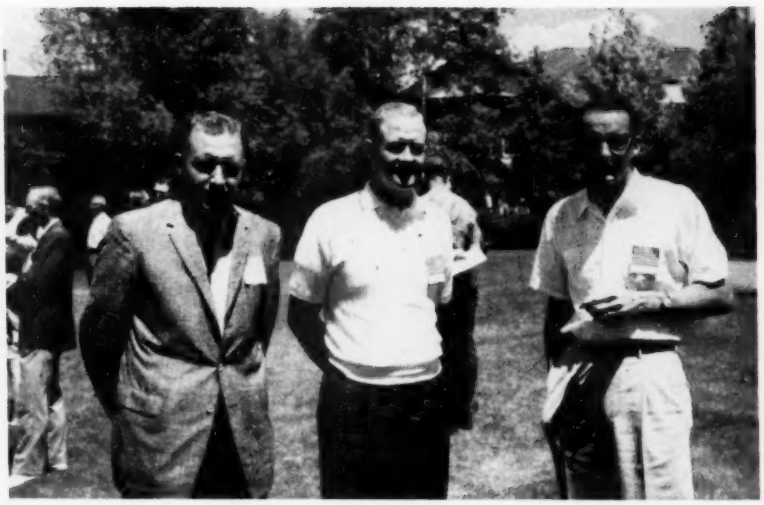
ANSWER by Mr. Schwab. "Very doubtful. The Senate Finance Committee will not do anything because the House Ways and Means Committee must start such hearings. The House committee has so much legislation that it won't start what it can't finish. Most importantly the committee members wonder why the President won't take any action when he has the immediate right to do so."

QUESTION by S. K. Droubay, manager, United Park City Mining Company, Salt Lake City, Utah. "What will happen to Concurrent Resolution No. 177??"

ANSWER by Mr. Redwine. "It will pass both houses before adjournment. The House will pass it first. The Senate



to Arthur Sallo, Callahan Mining Company. Mr. Schwab pointed out three needed changes in present quotas.



RECORD BREAKING PRODUCTION of uranium at Ambrosia Lake Rio de Oro mine was reported by manager Ray Schultz (left) to Idaho phosphate miners Frank Hendrickson and R. N. Crouse of Monsanto Chemical Company's Soda Springs operation.

For Lead and Zinc, Say Idaho Miners

Interior Affairs Committee will take immediate action without need for any hearings. The Senate should pass a Resolution somewhat similar to those of Senators Murray and Allott. After joint conference adaption, the Resolution goes to President for signature. He should sign."

Rare Metals and Phosphate

Idaho's Bear Valley placer deposits produced 99 percent of all columbium and tantalum oxides mined in the United States in 1958, reported Richard B. Porter, production manager of Porter Bros. Corporation which operates two connected bucketline dredges and an electrostatic separation plant in Bear Valley. See January 1958 and May 1958 issues of MINING WORLD for the exclusive report on Porter Bros. operations.

Euxenite concentrate from these dredges yielded the following percentages of total United States heavy rare earths output: Yttrium oxide, 31 percent; samarium oxide, 12; terbium oxide, 51; dysprosium oxide, 19; holmium oxide, 60; thulium oxide, 55; ytterbium oxide, 51; and gadolinium oxide, 17 percent. A considerable quantity of uranium is also recovered from the euxenite concentrate.

Bear Valley's dredges also recover monazite, ilmenite, garnet, and magnetite from the gravel.

The importance of this unique mining operation to the United States is growing every day as the United States Atomic Energy Commission uses more of the heavy rare earths because of their unique nuclear properties which span the full range of nuclear requirements. Gadolinium has the highest neutron cross section (ability to capture and hold neutrons) of any known element. Yttrium has low neutron cross section.

Donald G. Emigh, director of mining operations, Monsanto Chemical Company, and author of the annual phosphate review chapter of the MINING WORLD Yearbook, foresees an annual increase in use and mining of phosphate rock of four to five percent. The increase will be for both new products and new uses. Increased phosphate consumption is related very closely to population growth of 1.65 percent annually. Idaho is fortunately the supplier of most of the phosphate needs for California, where the population growth rate is three percent.

He predicted new mines near Ellison, Montana operated by The Bunker Hill Company, and a new mine and fertilizer plant in the more distant future to be operated in southeast Idaho by the Husky Oil Company.

Charles Murray, executive secretary to United States Senator James Murray, chairman of the Senate's Interior and Insular Affairs Committee, said that, "If the American people realized the seriousness of the problems of the mining industry, they would arise and demand immediate action for national security."

Despite the greatest outflow of gold from the United States in history, it doesn't seem possible that there will be an increase in the price of gold, reported Elroy Nelson, economist for the First Security Bank of Salt Lake City, Utah. He termed this outflow as the "Gold Rush of 1959," and said that if the price of gold was increased there would only be a further outflow with the weakening of the legal gold reserve position of the Federal government.

The following were elected for two year terms of office: president, Lester J. Randall, president, Hecla Mining Company, Wallace; first vice president, Joseph C. Kiefer, manager Northwestern Mining Department, ASARCO, Wallace; and Harry Marsh, second vice president.

This is the last convention that Harry Marsh will manage because he retired as secretary of the Idaho Mining Association immediately after the meeting. The entire mining industry thanks Harry for his many years of work and welcomes A. J. Teske, experienced Wallace public relations man and miner, as the new secretary.

END

**Joint Resolution No. 177 calls for an immediate investigation and report to the President and citizens of the United States on the position of the mining industry and its state of readiness for national defense.*



HIGH-GRADE ORE in face shows in sharp flat dark colored streaks above miner's hand. The rounder dark mass overhead is low grade with hydrocarbon coloring.



ORE IS MUCKED from draw points with Eimco RockerShovels. Light colored streak across bottom of picture is slusher cable from face at left to hoist at right.

Successful Small Mine In Big Uranium District

High-Grade Ore and Good Management More Than Offset Ambrosia Lake Water and Swelling Bottom Problems

There will always be a small miner!

True, it's getting tougher every day for the small miner to survive in this era of large-tonnage, low-grade mining and the big company trend toward increasing ore reserves by buying out prospectors and small miners.

Proof, however, that a small mining company can exist and make money from the first date of ore shipment is Four Corners Exploration Company of Grants, New Mexico. With its Hogan mine, it is the only small operator on the main Ambrosia Lake uranium trend. It is the only small miner pumping water in the Ambrosia Lake district.

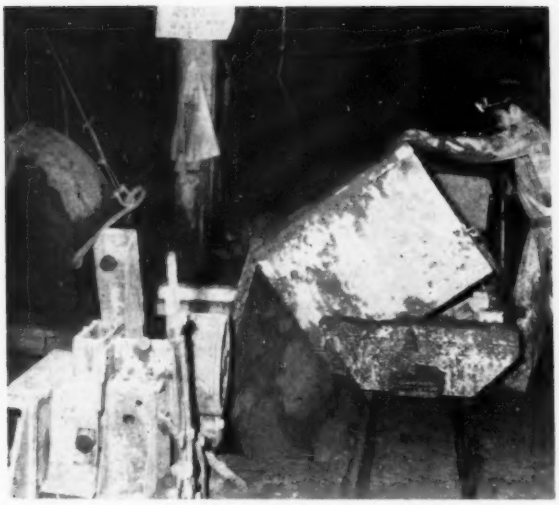
It's really a small company, too, with only two owners and a total of 12 men on the Hogan payroll, including the mine superintendent. The owners, Irving (Rusty) Rappaport and Forrest Fincher, are keen geologists and good managers, with many years of uranium experience, much of it in Grants district, and also in other states of the Colorado Plateau. Mr. Rappaport is general manager and deserves the credit for finding and profitably developing several other mines in the nearby Poison Canyon district, in addition to the Hogan. Four Corners is the operator and ⅜th owner, with the United Western Minerals-White Weld and Company-San Jacinto Petroleum Company group controlling the remaining interest.

The Hogan mine is located in Section 14, T. 13 N., R. 9 W. near the southernmost end of the Ambrosia Lake trend. Very possibly the main trend has split with the Hogan, Calumet & Hecla, Inc's. Marquez mine, and the San Mateo mine of Rare Metals Corporation of America on the southern channel. The Hogan is due north of the Marquez and northwest of the San Mateo. Directly north is the eastern extension of the much larger and apparently main Ambrosia Lake channel with the big mines of Phillips Petroleum Company—The Ann Lee, Sandstone, and Cliffside.

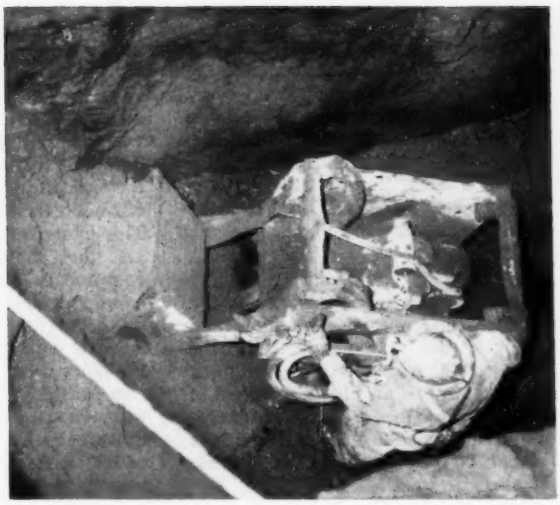
There's lots of room for ore between these channels and more ore will be found when the incentive to drill for it makes prospecting worth while. Some drilling has been done between the channels, but the area has just barely been touched by the drill bit.

Easy To Miss Ore

Interestingly enough, one of the problems at the Hogan, and the management is acutely aware of it, is the difficulty in finding all ore in the Hogan section. It sounds crazy when you say you can miss $100,000 worth of ore, but when you analyze the nature of the ore occurrence, it's very very easy to see why you can miss the 1,000 ton orebody worth the $100,000. That's only 14,400 cubic feet of ore. With an average mine thickness of 12 feet, such an ore body is only 12 feet wide and 100 feet long. There is no continuity laterally or vertically in these ore bodies. You don't follow



CARS DUMP directly into skip using the pocket as transfer chute only to prevent ore packing in pocket. Hogan mine has worst bottom in district.



DRAW POINT MUCKING TRACKS are turned at right angles from haulage drift so muckers load directly into main line cars. Ore packs in raises but can be loaded without difficulty.

a stringer that opens up.

When you normally drill holes on 100-foot centers, as was done at the Hogan, and even with some later fill-in holes at 50 feet, you are lucky to find that 1,200-square-foot area ore body in the 10,000-square-foot per-hole area.

That's the reason why experience and geological know how was important in discovering the Hogan. Four Corners secured its interest by drilling 10,000 feet of exploration hole with its own drill rigs which were available between contract jobs. With more than 1,000,000 feet of hole drilled on the Plateau, this was a minor job for Four Corners; yet it turned out to be more profitable than all the contract drilling.

The big reason Four Corners was anxious to drill in order to obtain an interest was the close surface geologic mapping that the company did. This mapping showed that a small but definite north-south striking anticline crossed the known east-west ore trend to establish a favorable structural position for ore. A facies change in the surface rocks was also discovered. If this change continued into the Poison Canyon sandstone, a second favorable condition for ore localization would be present.

Holes were collared in Mancos shale which proved difficult to drill because the rock was badly shattered. Therefore, circulation was lost in every hole. A total of 110 holes were eventually drilled to an average depth of 350 feet to reasonably indicate 200,000 tons of 0.50 percent U_3O_8 ore. Water was found in the bottom of all holes so it was known that there would be mining problems.

Shaft location was selected after a structural contour map, based on drill hole logging, was made at the base of the Mancos shale. It was then possible to locate the shaft so that nearly all the ore would be up dip on the anticline from shaft station. This meant mining would be up dip and drainage would be down dip to shaft sump. One small ore body actually is down dip from main level and an early attempt to mine this proved the wisdom of the shaft location because the down dip water problems proved more difficult than those in mining the main ore body.

The next step was the drilling of an 8¾-inch churn drill hole 60 feet from the shaft site to determine water inflow rate and to try and dewater area before sinking. Ninety days of continuous pumping from the hole only lowered the water 10 feet so shaft sinking was started on August 15, 1958 with plans made for handling water. By January 15, 1959, the two-compartment, each 5 by 5 feet inside the timber, shaft had been completed to a depth of 310 feet where cutting of a station was started. Sinking the



SURFACE PLANT with warehouse-compressor-hoist bulding at left. Steel headframe was moved from company mine at Bull Canyon.

35-foot sump below the level proved very difficult because it was in a bentonitic shale layer in the Poison Canyon. It was necessary to concrete the station, skip pocket, and sump every place this swelling bentonite was found. Incidentally, the Hogan has one of the worst bottoms of any mine in the district, from a mining standpoint, because the ore is right on top of this bentonitic shale bed.

Sub Level Development

After studying other mines in the district, their operating methods, and equipment, it was determined that the best plan to follow was to use track haulage, to first develop a sub level in waste below the ore, to establish a series of settling and desanding sumps ahead of pumping, to use electric slushers to pull all broken ore into draw point raises, to use Rocker-Shovels for draw point loading, and to start ore production as quickly as possible.

Once the station and sump were completed, drifting was pushed to open up the ore body for drainage and close observation. First ore was shipped in March and in May mining rate of 3,000 tons per month using two shifts was achieved. Maximum planned production is 5,000 per month with one shift.

As fast as possible, main drifts are being extended in footwall to limits of known ore. Then stub drifts and crosscuts are turned and driven to limits. Draw point raises are driven to top of ore for drainage and to establish working faces in ore. Thus, mining started within a few 10's of feet of the shaft and it was in good ore so that a profit was made from the first round in ore. This was a good thing, too, because the small company had invested $224,000 to make the first shipment. This figure includes exploration, sinking the shaft, purchasing mining equipment, and cost of the first 1½ months of development.

All development and stope drilling is done with four LeRoi pusher leg machines using 6-foot steel and tungsten carbide bits. All rounds are shot with electric caps because of water. Broken ore is slushed to draw points with four, Ingersoll-Rand, 15-horsepower, double-drum electric slushers.

Each draw point holds 30 to 50 tons of ore so a stope face can be completely mucked out in one operation. While muck settles and packs in these draw points and soon becomes saturated with water draining from stopes, it is loaded without difficulty by one of two Eimco 12B loaders into either 20-cubic-foot Card end dump cars or 40-foot Ajax side dump cars. Two Atlas 1½-ton battery locomotives are available for main line tramming.

Clear water from settling sumps is pumped into clear water sump with Flyght pumps. Two, 20-horsepower, Ingersoll-Rand motor pumps serve as station pumps; one is a standby unit.

Air is supplied by two 550-cubic-foot, Gardner-Denver compressors, each driven by a 25-horsepower electric motor. Ore is hoisted by a single-drum, 75-horsepower, Joy hoist.

Skips dump into a steel bin from which ore and waste are drawn into dump truck and hauled away from shaft. Waste is dumped and ore hauled to four stockpiles, each of different grade as determined by Giegering the loaded truck. Blended ore is shipped from these piles to New Mexico Partners' mill for treatment.

You can't minimize the advantages of competent management in any small mine. There are other important factors at any mine, too. Those at the Hogan include: high-grade ore (there is no substitute for this); development to ore ratio is low; there is very little waste to handle; company has relatively low capitalization, short tram to station, and ore is thick—averaging 12 feet with some drill holes showing 35 feet.

Offsetting these favorable factors are the following problems and adverse physical conditions: mine water is abrasive; swelling ground in many workings; bad bottom in drifts; erratic nature of ore; and vertical permeability of rock is poor necessitating extra drainage raise.

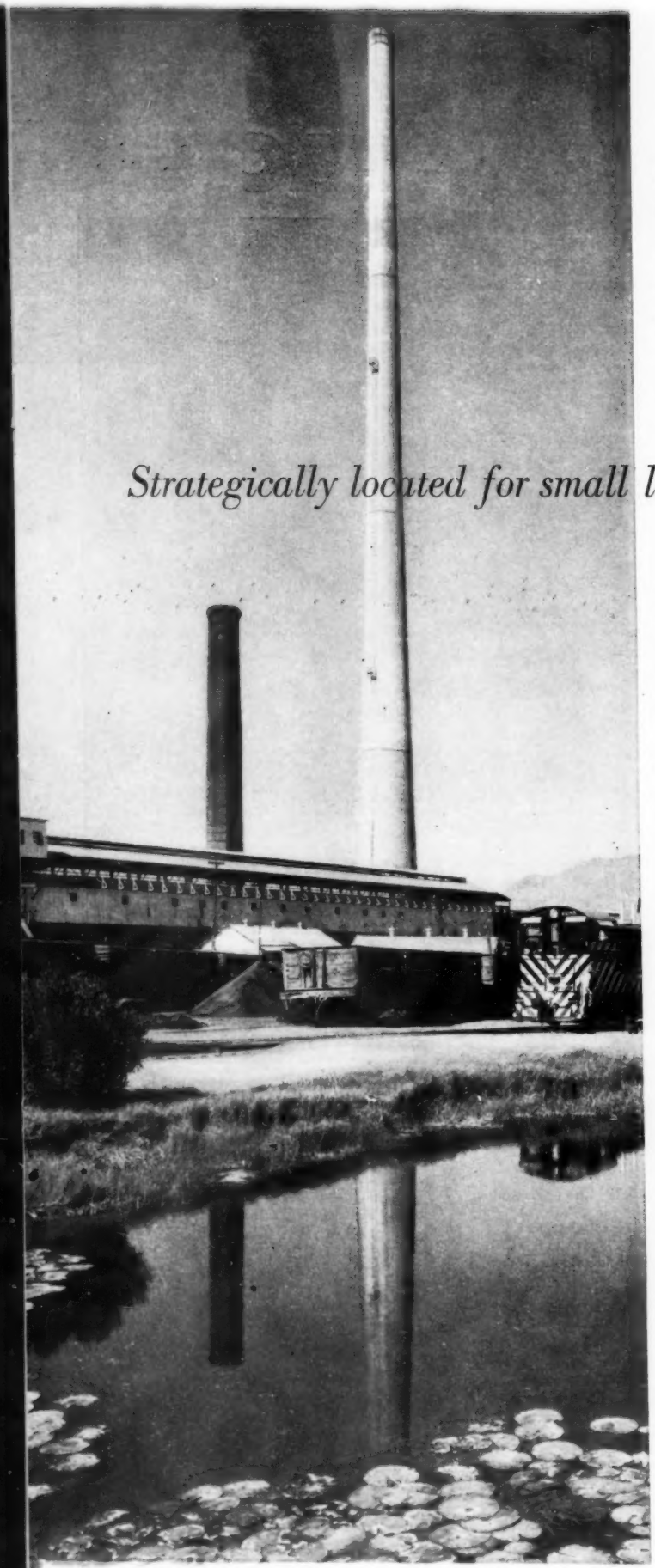
Four Corners is a truly successful mining company which can look to the future with confidence. END



SWELLING BENTONITE at contact with Poison Canyon sandstone (top) makes mining tough at this operation. Keeping drawpoints open is a problem; water is drained to level below ore.



SMALL MINE OPERATOR Irving Rappaport at collar of Hogan shaft. He is geologist, manager, purchasing agent, and ore salesman.



See ASARCO first
buying, smelting, and
refining all types of ores:
GOLD, SILVER, LEAD,
COPPER AND ZINC ores
and concentrates, blister
copper, mattes and residues
21 Smelters and Refineries

Strategically located for small lots or carload quantities...

LEAD SMELTERS
Selby, California
Leadville, Colorado
Alton, Illinois
East Helena, Montana
El Paso, Texas
Chihuahua, Chih., Mexico
San Luis Potosi, S.L.P., Mexico

ZINC SMELTERS
Amarillo, Texas
Corpus Christi, Texas
Rosita, Coah., Mexico

COPPER SMELTERS
Hayden, Arizona
El Paso, Texas
Tacoma, Washington
San Luis Potosi, S.L.P., Mexico

LEAD REFINERIES
Selby, California
Omaha, Nebraska
Perth Amboy, New Jersey
Monterey, N.L., Mexico

COPPER REFINERIES
Baltimore, Maryland
Perth Amboy, New Jersey
Tacoma, Washington

See management
at above locations
or write to main office.
American Smelting and
Refining Company,
Ore Purchasing Department.
120 Broadway,
New York 5, N. Y.

58-54

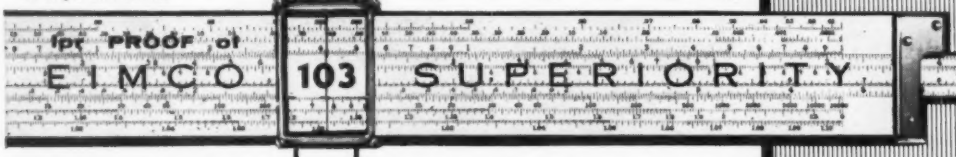
ASARCO

B - 452

EIMCO CHALLENGES YOU TO COMPARE THE FACTS

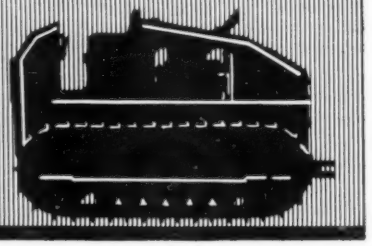
NOT THE CLAIMS

	EIMCO 103	CAT D-4	CAT D-6	AC HD-6	AC HD-11	INT. TD-9	INT. TD-15	CASE 1000
Maximum Drawbar Pull (zero track slippage)	33,000	10,700	19,000	15,485	21,980	13,240	23,750	24,000
Torque Converter	Yes	No	No	No	No	No	No	Yes
Master Clutch	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Power shift transmission on all speeds, with oil cooled metallic clutches that never need adjustment	Yes	No	No	No	No	No	No	No
Independently reversible track	Yes	No	No	No	No	No	No	Yes
Hydraulic track take-up	Yes	No	No	No	No	No	No	Yes
Heat-treated alloy steel grouser shoes, keyed to the track links	Yes	No	No	No	No	No	No	No
One-piece heat-treated alloy steel track rollers, tapered roller bearings	Yes	No	No	No	No	No	No	No
Equalizer bar of heavy duty heat-treated cast alloy steel, allowing full oscillation of crawler tracks with all attachments	Yes	No	No	No	No	No	No	No
Constantly running power take-off drives, front and rear, to standard SAE specs, with rear take-off not affected by track operation, and independent hydraulic pump drive allowing simultaneous use of hydraulic, winch and hoist accessories.	Yes	No	No	No	No	No	No	No
Front operator's seat for full visibility	Yes	No	No	No	No	No	No	No
Ability to operate forward and backward on up to 90% slopes	Yes	No	No	No	No	No	No	No
Tractor guaranteed for one full year of single shift service	Yes	No	No	No	No	No	No	No



WEIGHT BARE TRACTOR, POUNDS	15,000	10,910	17,605	12,600	20,500	11,925	22,540	13,200
H.P. — FLYWHEEL	100	63	93	66	99	71	105	90
TRACK GAUGE, INCHES (STD.)	60	60	74	60	74	60	74	60
STD. TRACK SHOE WIDTH, INCHES	16	13	16	13	16	13	16	16
LENGTH OF TRACK ON GROUND, INCHES	88	61	85 3/4	66 7/8	85 3/4	73	89 5/16	79
TOTAL TRACK AREA, SQ. INCHES	2,820	1,589	2,744	1,739	2,744	1,896	2,858	2,528
GROUND PRESSURE, PSI.	5.3	6.9	6.4	7.3	7.5	6.3	7.9	5.2
TRACK ROLLER DIAMETER, INCHES	8	8	8	7 5/16	7 1/2	N.A.	10 1/2	6
TRACK RAIL WIDTH, INCHES	1 3/8	1 1/4	1 1/4	1 5/16	1 3/8	N.A.	N.A.	1 1/8
NUMBER TRACK ROLLERS, EACH SIDE	6	4	6	5	6	5	6	5
TRACK BOLT DIAMETER, INCHES	5/8	1/2	5/8	17/32	5/8	1/2	5/8	1/2
TRACK BUSHING DIAMETER, INCHES	2 7/32	2	2 1/8	2	2 5/16	2 1/16	2 1/4	1 27/32
TRACK PIN DIAMETER, INCHES	1 17/32	1 5/16	1 7/16	1 3/8	1 5/16	1 3/8	1 1/2	1 1/4
SPROCKET PITCH DIAMETER, INCHES	32 1/2	29 1/4	30 1/2	28 1/8	31 1/2	28 1/4	30 1/2	24 1/2
GROUND CLEARANCE, INCHES	17	11 1/2	12 1/2	11 1/4	12 1/2	10 1/8	11	16

N.A. — not available



Above is from manufacturer's data and other sources believed to be reliable, but cannot be guaranteed.

IT'S A FACT . . . not a claim . . . that here is a MODERN line of tractors that makes all other crawler-tractors old-fashioned!

Other exclusive features includes Unitized "Stress Flow" Construction, for far greater strength and rigidity; Self-cleaning Air Cleaner that completely eliminates ordinary routine cleaner maintenance and others, far too numerous to list here. Write for details and specifications on all the advanced engineering features of the modern Eimco 103 line of crawler tractors.

AVAILABLE IN FOLLOWING MODELS:

103 — TRACTOR AND DOZER
123 — FRONT END LOADER
133 — STEEL MILL FEL
143 — LOG LOADER

"ADVANCED ENGINEERING AND QUALITY CRAFTSMANSHIP SINCE 1884"

THE EIMCO CORPORATION

EXPORT OFFICE: 51 - 52 SOUTH STREET, NEW YORK, N. Y.
BRANCHES AND DEALERS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

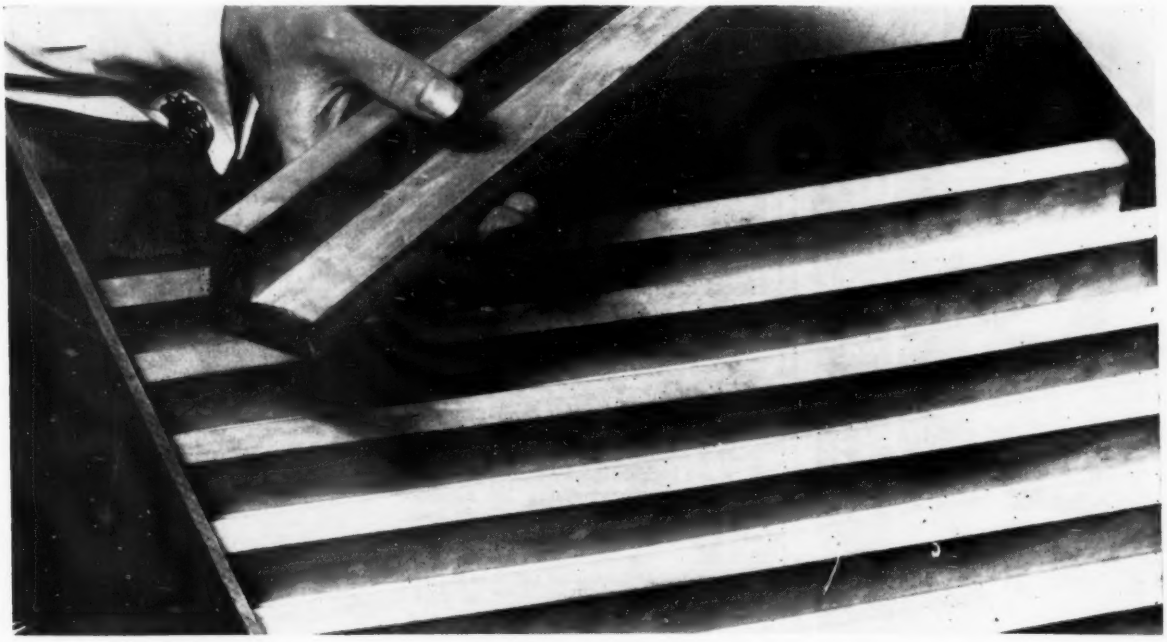
EIMCO

TRACTOR LOADER DIVISION

634 SOUTH 4TH WEST
SALT LAKE CITY, UTAH — U.S.A.

Production Equipment Preview

News about abrasion protection, compressed air products and earthmovers. For information on any item listed on the next three pages, use the reader-inquiry card opposite page 54.

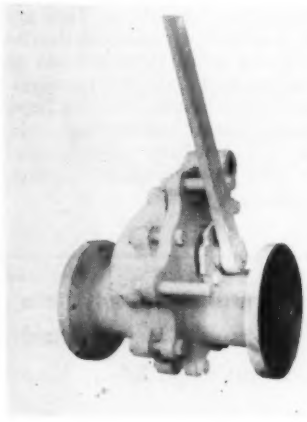


Soft Rubber Strips Are Newest Type Chute Lining Material

Wear from abrasive material is reduced by means of L-shaped strips fastened to wooden or steel chutes, according to B. F. Goodrich Industrial Products Company, a division of The B. F. Goodrich Company. The new lining is known as Rifflestrip. It is made from 2-inch strips of pure gum rubber.

The strips are placed together tightly with the riser of each L-shaped strip forming a series of parallel ridges across the chute. The ¾-inch rubber base of each "L" section forms a continuous protective liner for the chute. The strips are then nailed or bolted to the chutes.

Once the Rifflestripped chute is in use, abrasive material immediately fills the grooves between the ridges. From here on the material runs over itself and has nothing to abrade but itself. B. F. Goodrich recommends Rifflestrip chute lining for use on chutes, launders, hoppers and other wearing surface handling ore, sand or gravel; and on systems handling slimes or tailings. Users can install the lining without waste since the standard six-foot length can be cut easily and butted without impairing performance. The company states that wooden chutes lined with Rifflestrip will outwear expensive metal chutes protected with conventional rubber linings. For complete details on this new product Circle No. 8.



Gate Valve Cuts Clogging By Use of New Principle

Everlasting Valve Company claims that its new type of gate valve will greatly minimize the problem of slurry material clogging the interior of the valve body. Important features listed by the company include: unique shape of valve interior; and the sloping sides of the valve disc which causes the slurry to be recirculated in the body chamber when the valve is opened or closed. This action is said to prevent solids from packing up and causing the valve to be inoperative. Body of the valve is free of internal stops. If material does accumulate, purge holes are provided to introduce air, steam, or water under pressure into the body chamber. Circle No. 13.



New Tractor Scraper

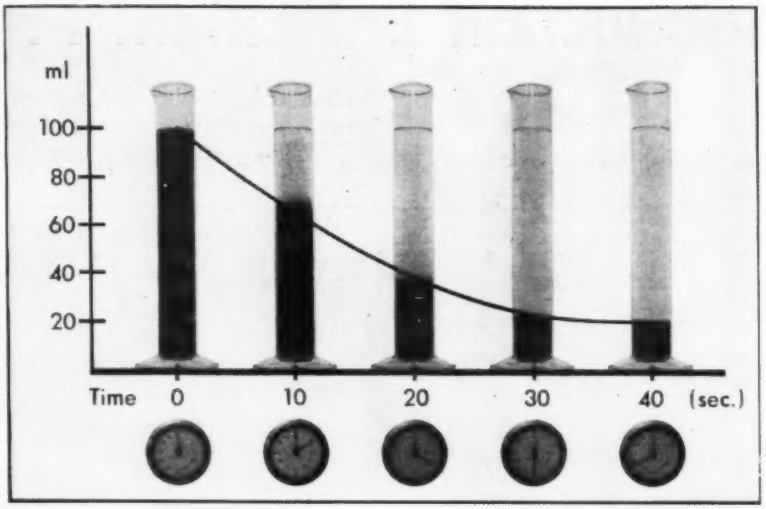
No. 463 Series C Scraper offers increased capacity (29 yards heaped); greater flotation (tubeless tires 26.5 x 25 on front wheels, 29.5 x 29 on rear); and more durable construction (two new support ribs that strengthen the welds between the bowl sides and cutting edge supports) says Caterpillar Tractor Company. Circle No. 17.

ROPE MASTER
MINING BLOCKS ARE AVAILABLE WITH THESE FITTINGS



Write for literature, prices and Name of Nearest Dealer

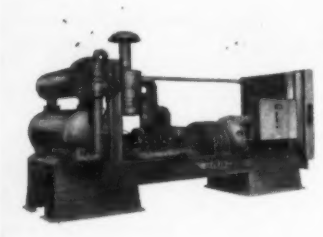
PAUL E. KEENEY CO.
1125 S. E. Grand Avenue
Portland 14, Oregon



Flocculating Agent For Liquid-Solid Separations

A flocculating agent in granular form has been developed by American Cyanamid Company. Known as Superfloc 16, the new product is said to be particularly effective in thickening operations for increasing settling rates and overflow clarity. It is a high molecular weight polymer which the company claims has consistently outperformed other synthetic and natural polymers as a filtration and settling aid.

In settling acid leached uranium ore at a Canadian CCD plant, 0.06 to 0.07 pounds of Superfloc 16 per ton of ore provided the same settling rate, overflow clarity and underflow fluidity and density as 0.11 pounds per ton of the previously used unit, according to American Cyanamid. The company also claims that Superfloc 16 decreased soluble losses of uranium by increasing underflow densities by 5 to 7 percent at CCD plants on the Colorado Plateau. The product is said to be easy to feed, wet and dissolve. Circle No. 6.



Rotary Compressor

Jaeger Machine Company now offers the first line of electric-powered rotary air compressors, featuring capacities of 130 to 625 cfm free air delivery at 100 psi. New models are 2-stage units said to be 30 percent lighter than reciprocating compressors of equal capacity. The manufacturer claims 80 percent fewer moving parts than reciprocating compressors. Circle No. 36.



PVC Lined Fittings Are Now Offered by Victaulic

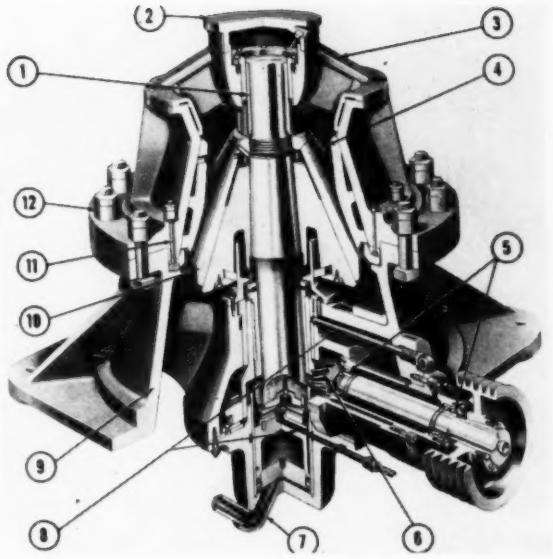
Victaulic Company of America announces a complete new line of Plastisol (PVC) lined pipe fittings in malleable iron or aluminum. The Plastisol lined fittings are supplied with grooved ends for quick-jointing pipe with Victaulic mechanical couplings. They are said to be suitable for handling slurries and abrasive solids in suspension at pressures up to 1,000 psi. The manufacturer reports that the Plastisol lined fittings are resistant to numerous acids, alkalies, salts, plating solutions and organic and miscellaneous reagents. Circle No. 3.

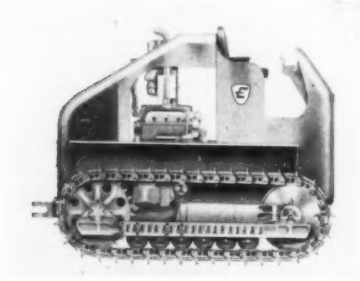
For information on any item use the reader inquiry card on page 54

Better Product Control Claimed For Hydrocone

New 36-inch Hydracone crusher has been developed by Allis Chalmers Manufacturing Company which is said to produce a greater output with reduced fines, wear, maintenance, and space requirements. The crusher features hydraulic adjustment of crushing head, is available with feed openings of 7, 4 and 2 inches. The company reports that the combination of accurate controlled size setting and short throw produces a higher percentage of usable product with less finely sized material than crushers designed with larger throws.

Numbered items on the photo are features that contribute to overall operating advantages reports Allis Chalmers. They are: (1) redesigned bearing and journal for longer life and reduced maintenance; (2) 2½-foot saving in head room cuts building costs and enhances portability; (3) two spider arms instead of three eliminate bridging of large size feed; (4) feed opening increased for larger material; (5) anti-friction bearings reduce maintenance; (6) new, quiet running spiral bevel gearing; (7) hydraulic adjustment of crushing head for fast, accurate control of product specification and compensation for wear; (8) improved lubrication to vital components lowers maintenance; (9) bottom shell flared outward to clear product from chamber faster with less wear; (10) crushing head is quickly and safely lowered to free tramp iron; (11) top shell and concave removable together for greater convenience and safety; (12) high-strength through-bolts for added rigidity. Circle No. 11.





Newly Designed Tractors

The Eimco Corporation has designed the 103 tractor, a smaller companion to the heavier 105 series. The new series will be available in four basic units. Model 123, a front end loader or fork lift, weighs approximately 25,000 pounds. Model 133 will weigh about 27,000 pounds. Model 103 is the tractor and dozer with both angle and straight blades. The model 123 has a 1¾ yard capacity and 23,000 pounds drawbar pull. The 103 tractor will be 11 feet 6 inches long, 7 feet 9 inches high and 76 inches wide, with a ground clearance of 17 inches. Maximum turning radius is 78 inches. Circle No. 12.



Plastic Conduit

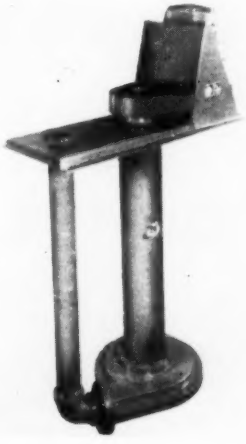
Lightweight conduit is approximately ¼ the weight of steel pipe, can be assembled and laid by one person. Made by Franklin Plastics, Inc., solvent-welded connections are made at the site by applying a thin layer of cement with a brush. Circle No. 9.

New Cross Belt Magnetic Separator Is Marketed

Magnetic Engineering and Manufacturing Company is producing a new separator said to feature increased effectiveness of the flux concentration through the use of as many as four wedge shaped edges on each pole. Because of the wedge-shaped pole feature, the Memco-Hope separator with 4 poles is frequently equivalent to 8-pole machines of other designs, according to company reports.

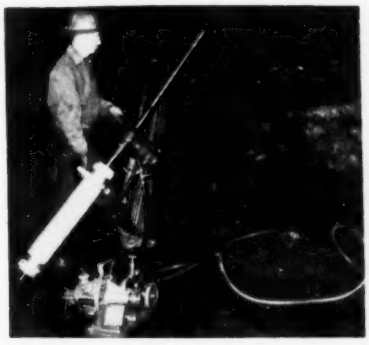
Another feature of the new Memco CB high power cross belt separator is individual pole control. Each pole is equipped with a complete adjustable magnetic circuit to permit closer control. This is especially valuable for separating minerals of similar magnetic susceptibility.

The new unit can be provided in sizes ranging from the laboratory unit having a 3-inch main belt with one cross belt, to a machine having a 24-inch wide main belt with 8 or more cross belts. For most materials a capacity of 1,000 to 1,500 pounds - per - hour - per - foot - of - belt - width is normal. Circle No. 10.



Vertical Sump Pumps

Rubber lined vertical sump pump is now in production by Denver Equipment Company. The pumps have capacities from 20 to 1,400 gpm and are available in sizes from 2 by 2 inches to 6 by 6 inches. Big advantage says Denver is that the pumps operate in small spaces on low horsepower without airlocking. Circle No. 14.



Air-Powered Core Drill Provides Flexibility

Developed for underground drilling of test holes, blast holes, wall samples and exploratory drilling, the new Packsack Diamond drill works wherever compressed air is available. Special features include low diamond cost because of a thinner face 1¾-inch bit and reduced water requirements. The machine has a detachable air leg that permits passage of cars. The Packsack has been used extensively in Canada. Circle No. 5.

UPPER 2 CARDS ENABLE



High Grade Results in Low Grade Ore

Two Marion 4161 machines are helping to point the way to high grade recovery of low grade ore in the Lake Superior region.

The diet of these machines is a hard, abrasive Jasper formation weighing 2.6 tons per yard. The Marions work on 40 foot benches in blasted pits ranging to 100 foot depths which may eventually reach 500 feet.

Let Marion mining machines, in a broad range of sizes and types, help you get high grade, high profit results.

CONSULT MARION MINING SPECIALISTS
for lowest costs on your property!

MARION POWER SHOVEL COMPANY - MARION, OHIO, U.S.A.
A Division of Universal Marion Corporation

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YOU TO WRITE THE

SHEAVE BLOCKS: There are no pins, chains, bolts, or nuts to handle on Joy Manufacturing Co.'s quick opening sheave blocks. The hook and side plates of the 6-inch, 8-inch, and 10-inch sizes are forged alloy steel, and the wheel is chrome-nickel-moly cast steel. A bulletin is available which describes Joy's complete line of blocks. Circle No. 20.

HIGH CAPACITY FEEDING: Syntron "Vibra-Flow" vibratory feeders help reduce ore handling costs by providing efficient, dependable high capacity controlled flow feeding to conveyor belts, screens, crushers and other process equipment according to the manufacturer. An informative brochure is available from the Syntron Co. Circle No. 21.

BLAST HOLE BITS: Spang blast hole bits are fully heat-treated from end to end, and are made to stand up under the tough drilling conditions. They are made with semi-dressed ends for quicker, easier finish-dressing, in High Carbon, A.I.S.I. 4340, and Spang Molloy Steel. For information Circle No. 22.

WICKWIRE ROPE recommendations for various jobs and functions are contained in a new brochure released by The Colorado Fuel & Iron Corporation.

GAS TURBINE announced by International General Electric will help reduce the problem of power generation during peak load periods. The new unit can be started minutes before peak demand surge occurs. The new gas turbine is a remote controlled combustion unit developed after five years of research. Circle No. 15.

HIGH PRESSURE PUMPS made by John Bean Division, Food Machinery & Chemical Corp., are available for such applications as core drilling, de-watering and general mine pump service. Full details are obtainable from the company. Circle No. 32.

NEW STARTER intended for fully automatic starting and stopping of engine driven generating sets has been marketed by the Automatic Switch Company. Circle No. 24.

UPPER 2 CARDS ENABLE YOU TO WRITE THE MANUFACTURER DIRECT FOR FAST SERVICE

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31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	81	82	83	84	85	86	87	88	89	90
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	91	92	93	94	95	96	97	98	99	100

Also send further free information on the equipment advertised on pages:

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DRAFTING MACHINE said to be maximum sized but economically priced has been developed by David Miller & Associates. Draftette Senior No. 12 retains features of smaller models, can be folded like a jacknife to fit into a briefcase. Circle No. 38.

PAINTS: Phosphorescent paints that charge themselves from natural or artificial light during the day so they can glow in night-time darkness are being produced by Ultra-Violet Products, Inc. Circle No. 39.

ROCK BITS: New 3-cone Jet Bit has been added to the line of rotary bits made by Varel Manufacturing Company. Jet nozzle on the new bit is positioned so that drilling fluid strikes the bottom of the hole with enough force to develop a cutting action of its own. Circle No. 40.

VENTILATION TUBING is now available in a bright yellow color to reduce danger of puncture by equipment. Nyprene flexible tubing, made by Bemis Bros. Bag Co., is light, can be suspended from Grommet or hooks. Circle No. 58.

2-WAY RADIO made by Motorola has been completely re-designed to take advantage of transistors. Motrac is a mobile radio for liaison with field units. Circle No. 59.

PLASTIC CABLE for mining machines and shuttle cars is described in a new brochure by Plastic Wire & Cable Corporation. It is said to offer potentially greater durability. Circle No. 60.

CAR SHAKER made by Stephens-Adamson Mfg. Co. is described in bulletin 658. S-A Carquake is said to provide hydraulically powered vibration with speed controlled to match required capacity. Unit is self-contained, requires no overhead structures. Circle No. 23.

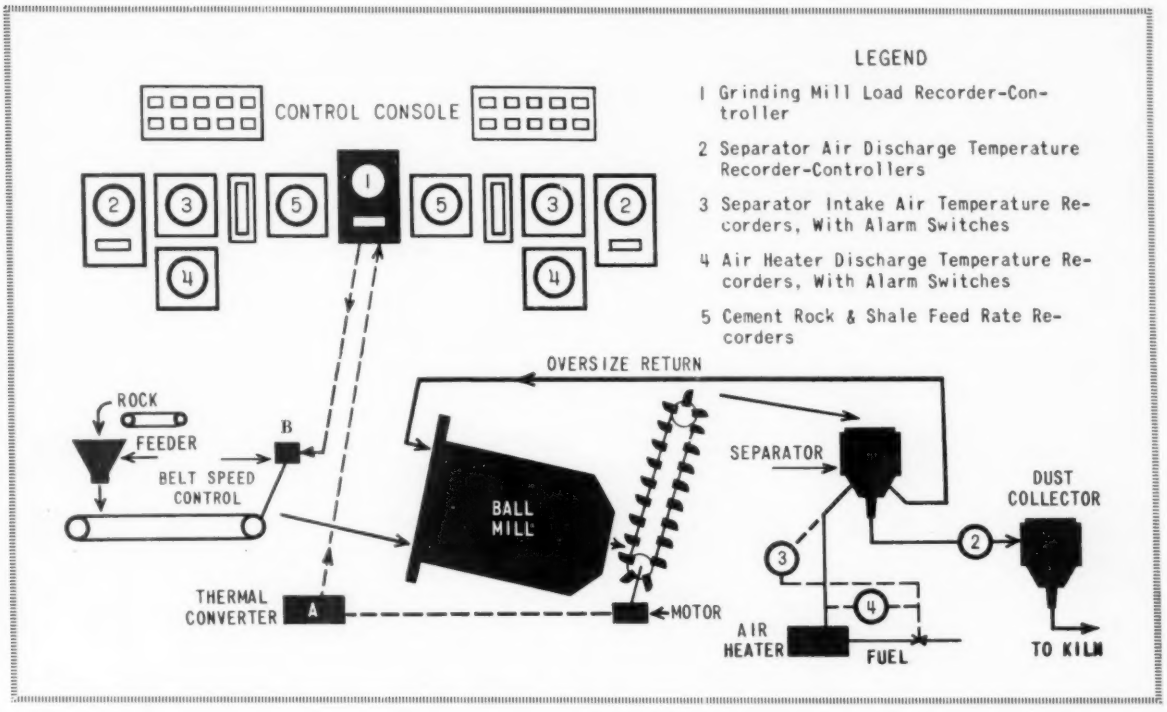
NEW AIR FILTERS for use with all types of small air-cooled engines and air compressors have been announced by Purolator Products, Inc. Circle No. 1.

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THICKENING AND CLASSIFICATION IN

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Money Making Methods



How Electronic Load Controls Raise Ball Mill Grinding Capacity

Electric load controls are used to maintain optimum grinding rates in dry grinding ball mills at the Louisville Cement Company's mill at Speed, Indiana.

The grinding flowsheet shown here differs from a conventional base metal flowsheet in that a bucket elevator is used for ball mill discharge. However, the same control principle and application could be used on a regular classifier in the opinion of many control engineers.

To solve the grinding mill control problem and increase capacity, company engineers worked with application engineers of Leeds and Northrup Company. Analysis of the problem showed that the electrical load on motors powering the mill discharge elevators bears a direct relation to mill loading, and therefore to grinding efficiency. If so, L&N engineers reasoned, why not use a measure of this load to control the mill feed rate?

Basic instrumentation selected consists of thermal converters as load-sensing devices, and Speedomax electronic recorder-controllers. The converters have long been used in the power industry; they measure electric power and supply the recorder-controller with a signal proportional to the measurement. They maintain their calibration with great constancy, and have a long history of dependability. The Speedomax instruments are also widely used in the cement industry for temperature, speed, and other conditions.

The ball mills are 13-by-16-foot units. Referring to the flowsheet, automatic control of grinding mill feed rate involves three major components: (1) a thermal converter "A" which measures kw load on the elevator motor, (2) an L&N Speedomax H recorder-controller which receives the converter's electrical signal and, through a motor-operated drive unit, regulates the speed of (3) the feed conveyor motor "B." The recorder-controller, marked "1" on flowsheet, has L&N's three-action "P.A.T." electric control; this includes proportioning, rate, and reset actions to maintain close automatic control at the desired grinding rate. Each ball mill has a dual set of elevators with a thermal converter on each; the electrical measuring circuit is so arranged that either converter can be connected to the Speedomax instrument, or both converter outputs can be averaged for mill load control.

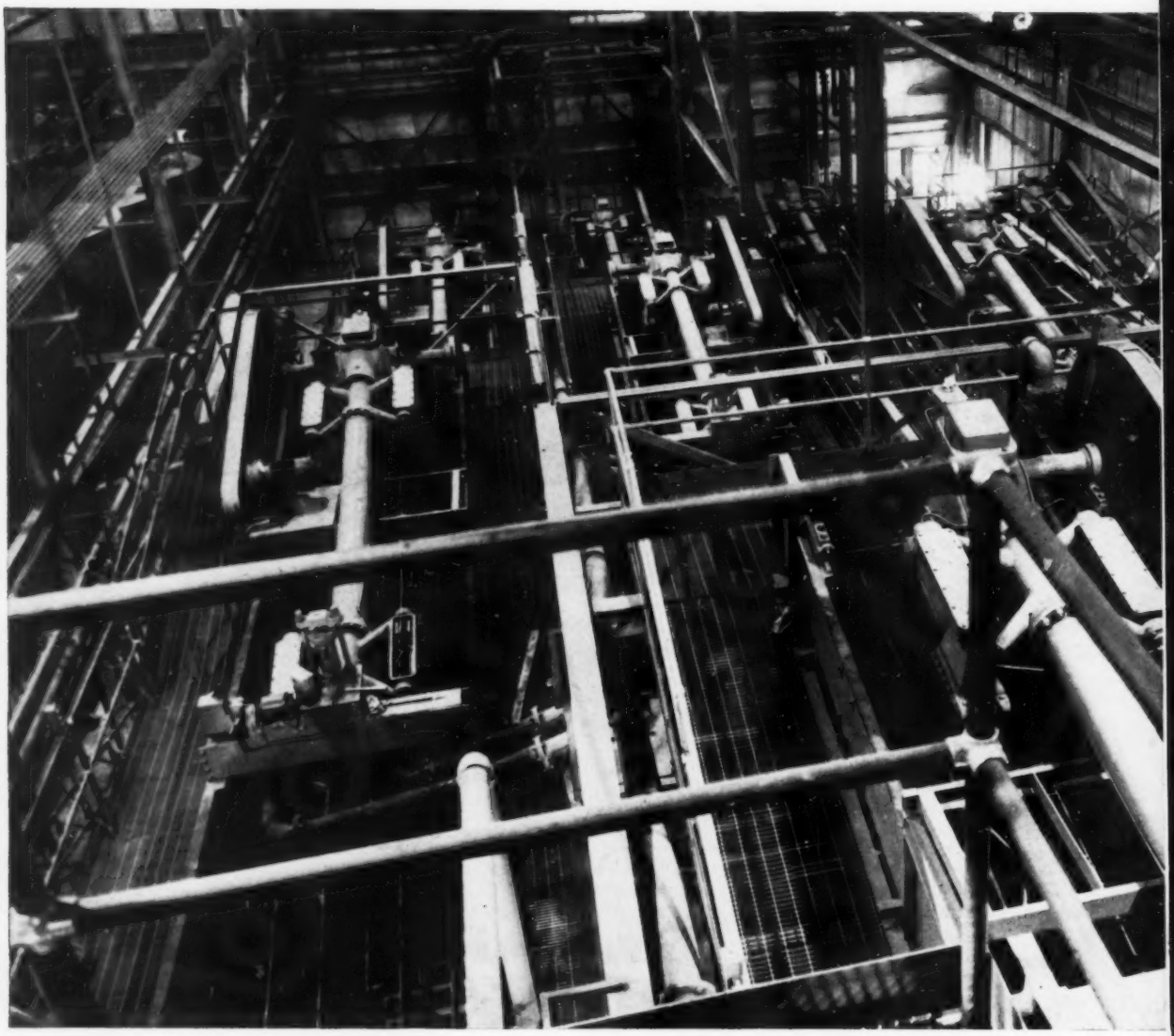
Each of the ball mills has a dual set of elevators, air separators, and air heaters. Temperatures are recorded by means of thermocouples connected to panel-mounted, Speedomax H recorders (marked "2," "3," and "4").

Also mounted on the separate panels for each raw mix mill are two L&N recorders (marked "5") for the feed rates of cement rock and shale from storage silos. These measure the separate feed rates of these raw materials by means of tachometers on the respective conveyors.

Totalizing digital indicators on the consoles show total amounts of feeds for production records.

Not only is the mill ingeniously automated for efficient production, but also it is well protected for safe operation. A bank of panel alarm lights can be actuated by switches to indicate improper materials handling of solids flows throughout the plant. Ammeters on the panel indicate current drawn by various motors and can detect overload conditions. Solids level indicators on the panel show levels of stone and shale in the silos. Combustion safeguards protect the air heaters. Finally, a 16-point Speedomax recorder continuously plots various bearing temperatures on the ball mills, feed journals, and air separators.

THICKENING AND CLASSIFICATION IN



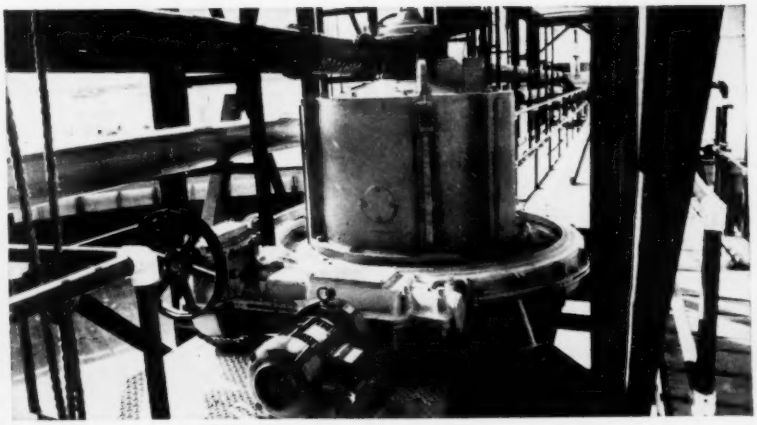
Kermac Nuclear Fuels Corporation uses Dorr-Oliver equipment in giant New Mexico operation

The 3,300 TPD acid leach uranium mill of the Kermac Nuclear Fuels Corporation ranks as one of the most spectacular operations in the huge uranium ore processing center that has grown up in the Grants, New Mexico, area.

A feature of the mill is its use of heavy duty Dorr-Oliver equipment in the thickening and classification circuits. The six Dorr C.C.D. Thickeners installed, each 120′ in diameter x 17′ C.D., with rubber covered underwater parts and stainless steel blades, are the largest center shaft or overhead suspension type thickeners ever manufactured. Underflow from the thickeners is handled by batteries of Dorrco rubber lined duplex diaphragm pumps, three for each thickener. Sand-slime separation is made at 100 mesh by hydraulic cyclones, and the sands are washed in two parallel circuits with a total of ten Dorr

3,300 TPD ACID LEACH URANIUM MILL

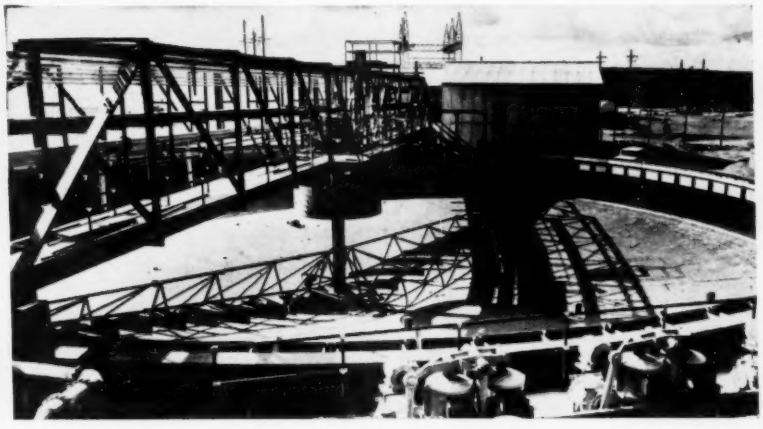




▲ DORRCO THICKENER DRIVE HEAD shows massive design. This unit features balanced double reduction worm gear and motorized lifting device to lift thickener rakes 24 inches.

◀ C.C.C. SANDS WASHING CIRCUIT includes ten Dorrco rubber lined Classifiers, each 6′ wide x 33′ long. Photo shows arrangement in two parallel circuits.

DORRCO COUNTER-CURRENT DECANTATION THICKENER, 120′ diameter, is one of six installed in the "B" circuit. Also shown in this photo are the Dorrco rubber lined duplex diaphragm underflow pumps, three of which are used with each thickener. ▼



rubber lined classifiers, each 6′ wide x 33′ long. Classifier blades are stainless steel.

The know-how behind each unit of Dorr-Oliver equipment is based on more than half a century of world-wide experience in metallurgical processing. Whether your requirements be for individual equipment or a complete design and consulting service, D-O can be of help to you. For complete information, write to Dorr-Oliver Incorporated, Stamford, Connecticut.

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You've got industry-topping, power-to-payload wallop in these giant new models. You get the sock of 375 high-torque turbocharged diesel "horses" from International's fuel-thrifty new DT-817 six-cylinder diesel. You get direct, push-button starting; all-altitude high-efficiency performance.

Exclusive bowl "with a flare" loads and keeps bigger heaps!

Exclusive new Payscraper tapered bowl design out-cycles "slow loaders," "load spillers," and "reluctant dumpers." Widest of all cutting widths—131 inches—lets scraper wheels and pusher operate inside the cut, the best traction zone. Wide-cutting bowl and center rolling boil-in speeds heap loading. The tapered bowl is a superior heapholder even at the faster haul speeds. Obstruction-free bowl provides fast, positive jam-proof ejection.

Operators become full-time earthmovers!

Minute-stealing operating delays are eliminated, with speed-gaining, balanced design. The 295 Payscraper operator, for example, commands ample power and traction to pull out of 90° turns—even on soft fills—without time-losing back-ups.

The operator rides in cushioned comfort in a 16-adjustment seat that smothers bumps. He has reach-easy power brakes, "control tower" vision, flush deck safety. For the first time in big 2-axle scraper history, the operator becomes a confident, full-time, full-capacity dirt-mover!

From power to push-block—from fuel thrift to dirt on the fill—compare new giant-sized International Payscraper models to anything else on wheels. Note how they lead in turbocharged diesel horsepower. Match exclusive tapered-bowl scraper advantages against less-advanced design. Size up strength—ease of control—speed—capacity! See your International Construction Equipment Distributor!

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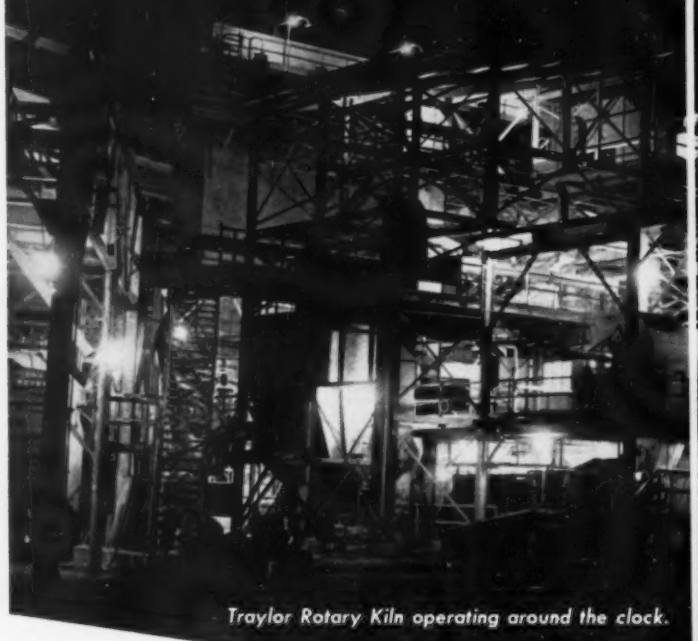


Three "295's" of a 6-unit Payscraper fleet, building new superhighway near Beloit, Wisconsin. Both the "295" and "495" feature International's fast-acting, finger-tip controlled model 280 cable control unit—built to give you high capacity; simple adjustments; low upkeep! Positive, forced ejection, plus gaping 98" apron opening, assures fast, positive dumping of all materials. Even gummy, barrel-sized blue clay chunks are quickly ejected—as this "495" view proves, on an operation of V. H & M Construction Co., Denham Springs, Louisiana.

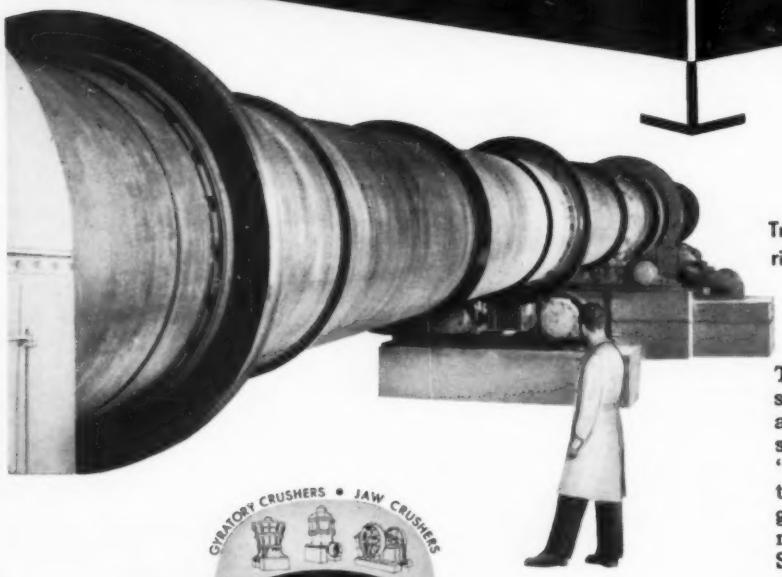


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United States

Personalities in the News——



JAMES D. MOORE, former production manager, has been named plant manager at Vitro Uranium Company's uranium mill in Salt Lake City. Mr. Moore, a graduate and former instructor at the University of Missouri, has served Vitro Uranium as chemical engineer, senior chemical engineer, and chief process engineer before being named production manager in 1958.

George D. Dub recently retired as president and general manager of Coronada Copper and Zinc Company, a subsidiary of Cyprus Mines Corporation, Los Angeles, California. Mr. Dub will resume consulting engineering in Los Angeles.

Jess Larson, former Federal Works Administrator and Chief of the War Assets Administration, is chairman of the Board of Directors of a newly formed company, the National Patent Development Corporation. Mr. Larson is also a director of Jen, Inc., a Utah uranium producing company. The new company will represent companies owning patents and processes in finding other concerns that are ready to develop and manufacture them for the benefit of the public, the government, and other potential users.

Bert C. Austin, San Francisco, California consulting engineer, has been named to the State of California Mining Board. The board chairman, Philip R. Bradley, Jr., has offices at the Division of Mines headquarters, in the Ferry Building, San Francisco, California.

Sherrel Heaps, former reverberatory furnaceman helper at the Ray reduction plant of Kennecott Copper Corporation, Ray, Arizona, was recently promoted to reverberatory shift foreman.

Texas-Zinc Minerals Corporation, Grand Junction, Colorado, recently announced the election of **Neil K. Banks** and **Harold E. Christensen** as vice presidents. Texas-Zinc Minerals, jointly owned by the Texas Company and the New Jersey Zinc Company, owns and operates a uranium processing mill at Mexican Hat, Utah, and the Happy Jack uranium mine in the White Canyon area, Utah. Mr. Banks had been serving as general manager of Texas-Zinc, and Mr. Christensen was assistant division manager of Texaco's Domestic producing department offices in Denver, Colorado.

George Bell, chemist and metallurgist for the New Cornelia Branch, Phelps Dodge Corporation, Ajo, Arizona, has retired. With the exception of the period from 1931 to 1945 when he was in the Philippine Islands, Mr. Bell has been employed at the New Cornelia Branch since 1924.

Kennedy Ellsworth has been elected a director of Desert Minerals, Inc., and its affiliate, American Mineral Company. Mr. Ellsworth was previously associated with the United States Lime Products Company as vice president and general manager, and later, when that company was acquired by the Flintkote Company in 1956, he served as general manager of the U. S. Lime Division. Mr. Ellsworth will have offices in Los Angeles, California.

The following changes have recently been made in the Snyder Mining Company's Mesabi iron range staff in Minnesota. **Wayne Meadows** has been promoted to mechanical superintendent, succeeding **A. A. Erickson** who has retired. **T. J. Barker** has been named superintendent of the Webb mine in addition to his present position as superintendent of the Whitside mine. **J. J. Maney,** superintendent of the Webb mines, has retired.



Members of the executive board of the newly formed corporation, Four Corners Oil & Minerals Company are (left to right): EDWARD A. KOESTER, past president of American Association of Petroleum Geologists; G. DEWEY HYNES, executive vice president of General Cable Corporation; EUGENE H. SANDERS, founder and president of Four Corners Uranium; and THOMAS J. MURPHY, Equitable Life Assurance Society of the United States. The new corporation was formed by a merger of Four Corners Uranium Corporation and a privately owned oil and land company. Other directors of the company are: DR. EDWARD L. CLARK, of Grand Junction, Colorado; DR. DONALD MENZEL, director of the Harvard Observatory; and TAFT BARROW, head of Occidental Life Company.

George R. McGrath, vice president of White Pine Copper Company, has also been assigned duties assisting the vice president and comptroller of the Copper Range Company in Boston, Massachusetts.

Marion F. Bolton, manager of operations for Kerr-McGee Oil Industries at Shiprock, New Mexico, has been named general manager of operation for Kermac Nuclear Fuels Corporation at Grants, New Mexico. **Clifford L. Wise** will replace Mr. Bolton as manager of operations for Kerr-McGee at Shiprock.

Inland Steel Company's general manager of Iron Ore Operation, **R. D. Satterley,** recently announced several executive promotions. **P. D. Pearson** was named manager of iron ore mines with offices at Ishpeming, Michigan, following service as manager of Caland Ore Company Ltd. Mr. Pearson, a graduate of Lehigh University, joined Inland in 1936 and has served as superintendent of various mines on the Menominee Range of Michigan prior to his move to Atikokan, Canada. **P. P. Ribotto** has been named to replace Mr. Pearson as manager of Caland Ore Company Ltd. at Atikokan. He joined Inland in 1940 and has served as engineer of the Morris and Sherwood mines in Michigan before becoming chief engineer of iron ore mines. **D. E. Brown** succeeds Mr. Ribotto as chief engineer of iron ore mines. Prior to this new assignment, Mr. Brown held the position of senior engineer at the Sherwood Mine in Iron River, Michigan.

The stockholders of Lucky Friday Silver-Lead Mines Company recently elected **John E. D. Grunow,** New York attorney for Newmont Mining Corporation, to the board of directors. Reelected to the board were **L. J. Randall,** president; **H. F. Magnuson,** vice president, **George W. Zeller,** and **William H. Love,** general manager, all of Wallace, Idaho. **D. W. Morsehouse,** Wallace, was elected secretary-treasurer to replace **W. J. Emacio,** who resigned.

A. J. Gleason has been appointed consulting metallurgist for Oreclone Concentrating Company, Virginia, Minnesota. Mr. Gleason was formerly a metallurgist with Pickands Mather and Company.

G. W. DeLaMare, general superintendent of United Park City Mines Company of Park City District, Utah has accepted a partnership with **Will Austin** in the Iron King iron ore mine near Winnemucca, Nevada. **Walter J. DeZell,** manager of mining at the Conda, Idaho phosphate property of The Anaconda Company, will succeed Mr. DeLaMare as superintendent.

Raoul Choate has joined the Idaho Bureau of Mines and Geology at Moscow, Idaho as minerals engineer, replacing **Kenneth Hollenbaugh.** Mr. Choate has previously worked as a geophysical engineer at the Willow Run Research Center of the University of Michigan and has been on the teaching staff of the College of Mines at the University of Idaho in Moscow.



ARTHUR TERRY, JR., vice president for International Administration and director of Dorr-Oliver Incorporated, Stamford, Connecticut, U.S.A., resigned recently. Mr. Terry will continue to serve Dorr-Oliver after his retirement as a consultant in the international field. Vice president DOUGLAS C. REYNOLDS, former director of Technical Operations, has assumed guidance of all international operations. Mr. Terry, during his 38 years with Dorr-Oliver, was responsible for the establishment of several European subsidiaries and coordination of the work of all.

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Newsmakers in International Mining

Henry A. Brimo, president of Philex Mining Corporation, Philippine Island, recently spent a month and a half in Japan and the United States. The purpose of his trip was to contact companies in connection with his copper mining and oil exploration organizations.

Lee R. Stoiser is now associated with the Paul Weir Company, Inc. of Chicago as a mining engineer. He is headquartered in Seoul, Republic of Korea where he is examining mineral deposits under the ICA aid program to the Korean government.

Melquiadez A. Ulep, formerly associated with San Mauricio Mining Company, Jose Panganiban Canis, Norte, Philippines, is now superintendent for United Gypsum & Minerals, Inc., Inowayan, Cawayan Occ. Negros, Philippines.

A. Royden Harrison has been appointed chief consulting engineer of the Anglo American Corporation of South Africa. He will replace **H. G. McKerrow**, who has resigned.

D. R. E. Whitmore, former chief geologist with Heath Steele Mines Limited at Newcastle, New Brunswick, Canada, is now at 905 Kingsmere, Ottawa 3, Ontario, Canada.

G. Gregory Bryan, formerly with the National Lead Company in New York, is now at Buenos Aires, Argentina with the National Lead Company, S.A.

Bolidens Gruv AB of Sweden has transferred **Sigvard A. G. Ando Bergsing** from the company's operation at Boliden to their office at Sturegaten 22, Stockholm Ö, Sweden.

Dr. A. E. Moss, chief engineer of the Iron Ore Company of Canada, Schefferville, Quebec, Canada, has recently been transferred to the company's Carol project at Seven Island, Quebec, as mine manager.

R. J. Hopkins, works research superintendent at the Port Pirie lead smelter and refinery of The Broken Hill Associated Smelters, Ltd., South Australia, visited The Bunker Hill Company's lead smelter at Kellogg, Idaho, U.S.A., recently. While in the United States, Mr. Hopkins attended the International Symposium on the Physical Chemistry of Process Metallurgy at Pittsburgh and the meeting of the Lead Industries Association.

J. Quets, consulting engineer for Union Miniere du Haut Katanga in Brussels, Belgium, was recently a guest at the annual dinner of the Northern Rhodesian section of The Institution of Mining and Metallurgy in Nkana. Guest speaker at the meeting was **Sir Ronald Prain,** chairman of the Rhodesian Selection Trust group.

Arthur P. Nelson has moved to Arlington, Virginia, U.S.A. from Cuba where he was with Minas de Matahambre, Province de Pinar del Rio.

J. Stuart Anderson recently resigned as Deputy Provincial Treasurer of the Province of Manitoba, Canada to accept the position of assistant to the vice president and assistant treasurer of The International Nickel Company of Canada, Limited. Mr. Anderson was also elected to these same office in The International Nickel Company, Inc., the company's United States subsidiary.





CARROLL P. DONOHOE (left) has been elected president and general manager of the Cananea Consolidated Copper Company, a subsidiary of The Anaconda Company, at Cananea, Sonora, Mexico. Mr. Donohoe succeeds ALBERT MENDELSOHN who has retired. ROBERT C. WEED (right), formerly general superintendent, has been named vice president and assistant general manager. GEORGE E. MORRIS has been elevated to the position of general superintendent. Mr. Donohoe, a graduate of Montana State College, has been with The Anaconda Company since 1925, and was named general superintendent at the Cananea operations in 1949. Mr. Weed, a graduate of Michigan College of Mining and Technology, has held mining engineering posts at both Butte, Montana, and Cananea, Mexico, where he has been located since 1949.

Otis W. Allen, asistant to the manager, International Mineral and Chemical Corporation, Mulberry, Florida, U.S.A., and **Richard N. Hill,** research specialist at IMCC's experiment station in Florida, visited Japan where they gave technical assistance to users of Florida phosphate rock. They visited plants throughout Japan and exchanged information on manufacturing methods.

Daniel Woodward has assumed the position of metallurgical consultant for the Cia. Minera Tamaya, Chile. Mr. Woodward for many years was professor of metallurgy and mining at the La Serena School of Mines, La Serena, Chile.

T. E. Vaughan will assume the position of assistant chief of the planning division of the new by-products project for the Cia. Anglo-Lautar de Salitre, Chile. Mr. Vaughan, a native of Liverpool, England, has been associated with various Chilean and English firms in Chile for the past nine years.



WALTER K. SCHEIBE was recently named vice president and general manager of the Liberia Mining Company Limited, located in Monrovia, Liberia, West Africa. Previous to this appointment, he served as assistant manager from November 1954 until the time of his promotion.

The White Pass and Yukon Corporation Ltd., Canada, has announced the following organization changes: **Norman F. W. H. D'Arcy,** London, England, has been elected vice president; **A. P. Friesen,** Vancouver, British Columbia, former secretary, has been appointed vice president, secretary and treasurer; **C. J. Rogers,** former president of subsidiary operating companies, will serve as chairman of the boards of these companies; and **C. F. Abrams,** former executive vice president of the subsidiary companies, will serve as president of these companies.

L. E. Fish, former mine superintendent of Chile Exploration Company's Chuquimata open pit, has been promoted to assistant to the general manager of that company. Mr. Fish, a graduate of the Nevada School of Mines in the United States and a longtime employee of The Anaconda Company, developed production of the Chuquimata mine to one of the highest in the world.

Dr. W. J. Busschau has been appointed a joint general manager of New Consolidated Gold Fields Limited, South Africa. **P. S. Hammond** remains the resident director and general manager of the same company.

S. M. Sair, director, Bureau of Mines of Indonesia, **Mr. Tampubolon,** and **Mr. Kasir,** all of Indonesia, recently toured United States mining operations. The touring Indonesians came to the U. S. from Japan where they spent two weeks touring Japanese mining operations.

New members of the board of directors of the Apayao Mining and Oil Company, The Philippine Islands, are: **Alexander A. Adamson, Emilio G. Martinez, Zoilo Alberto, Eusebio S. Garcia** and **Secretary Manuel Lim.** Reelected members of the board are: **Gaudencio E. Antonino,** board chairman and president; **Juan J. Carlos,** vice chairman; **Judge Carmelino Alvendia, Dean H. R. Reyes, Juan R. Redoblado** and **Consorcio Borje.**

Anglo American Corporation of South Africa Ltd. have recently appointed the following consulting mechanical engineers: **S. Dwolatsky, A. H. Gyngell, C.P.A. Louwrens,** and **W. Martin.**

Stockholders of the Philex Mining Corporation, The Philippine Islands, recently reelected the following men to the board of directors: **Henry Brimo, Jose R. Tuason, Domingo Franco, Albert Awad** and **Ernest J. Klinger.** Two new board members elected were **Ricardo Ledesma** and **Jacob Cabarrus.** At the reorganization meeting Mr. Brima was reelected president, Mr. Klinger was voted executive vice president, **Paul A. Schaffer** was elected vice president and geologist, and **Teodulo Bautista,** secretary and assistant treasurer.

Joseph Marincel, formerly at Anaconda, Montana, is now with the Andes Copper Mining Company at El Salvador, via Antofagusta, Chila.

Recent visitors to the Rhodesian Copperbelt included the following personnel of the Falconbridge Nickel Company, Canada: **R. C. Mott,** vice president; **C. T. Mitchell,** geologist; and **P. MacRoden,** mine superintendent.

UNITED STATES NEWS

Chino Division Schedules Mine Projects for Future

Two new future projects have been revealed in the long-range mining plans for the Santa Rita, New Mexico, open pits of Kennecott Copper Corporation's Chino Mines Division. The first project to be undertaken in the years ahead is the removal of the island which separates the south pit (where most of the production now originates) from the smaller north pit. Mining will be extended from the south pit until it joins the north pit. The ore in the island area has a high magnetite content and treatment will probably require changes in the methods now used for milling and smelting south pit ore.

The second major project will be the development of the Lee Hill area southwest of the town of Santa Rita. The Lee Hill area contains one of the bigger ore bodies around the present pit, and it can actually be thought of as an extension of the present workings. Preparatory plans for mining the Lee Hill area are now underway. Active extraction, however, is still several years away. First the area must be drilled to yield more precise information regarding the attitude, shape, and characteristics of the ore.

Other active projects underway at the mine include stripping of the Niagara ore body in the south pit (see MINING WORLD, April 1958, page 62). A new 8-yard shovel and seven Euclid trucks were purchased for this project. Another project announced recently included an expansion of leaching and precipitating facilities for oxide dumps (see MINING WORLD, May 1959, page 31). New facilities will include seven new plastic-lined steel pipelines, an enlarged water distribution system, and new pumping capacity for return of barren water. The proposed skip haulage system for the south pit is still under careful study. A firm decision has not yet been made whether to go ahead with this installation.



Diamond drilling in a copper zone at the **Springfield** mine, five miles southwesterly from Crown King, Arizona, has been started by the **C. I. T. Mining Company** of Albuquerque, New Mexico. The crew consists of two drill runners. So far, several holes have been drilled to a depth of around 500 feet and the crew presently is drilling a hole destined for a depth of 1,000 feet. Following completion of this hole, the company is said to plan to deepen the existing 185-foot shaft, then explore laterally at a new horizon.

Bear Creek Mining Company has a small crew conducting geophysical surveys in the Morristown area of Arizona. Last year Bear Creek located several large groups of claims in the district, centered about 14 miles to the east of Morristown, and conducted considerable geologic and geochemical work, then suspended operations. The work was resumed this spring under the direction of Raymond F. Robinson, Bear Creek's senior exploration geologist.

A substantial amount of copper concentrates has been accumulating in a stockpile west of the smelter of **Kennecott Copper Corporation's Ray Mines Division** at Ray, Arizona. The accumulation started several months ago prior to the termination of Kennecott's smelting agreement with the **American Smelting and Refining Company.** It was necessary for Kennecott to cut back on the smelting rate in order to handle new smelter startup and changes in the settings on the waste heat boilers. Thus, where normal concentrate inventory is about 5,000 tons, it was as high as 46,000 tons by the end of June. The firm hoped to reduce the stockpile appreciably by the end of the vacation shutdown when the smelter would be operating. The grade of concentrates produced from the **West Pit** ore is low and averages only about 14 to 15 percent Cu. The grade of concentrates from the **Pearl Handle Pit** is considerably higher.

Mesa Minerals Corporation, Wickenburg, Arizona, has placed its gravity concentration plant in operation. This plant, with a capacity of 150 tons daily, is located at the old **Vulture** tailings dump and initial plans call for treatment of the tailings to recover the contained lead, gold, and silver. Later, the company hopes to accept amenable custom ores. W. O. Goldsby is in charge of the work for Mesa Minerals, a Dallas, Texas concern. Paul E. Rice is engineer and assayer.

The **Mesa Ives Mining Company** has leased its manganese property, 50 miles south of Winslow, Arizona, to B. J. Brummell of Coronet, Kansas, and his associates, Wm. Humphrey and Frank Zook. The new work is being conducted under the name of **Winslow Products Company.** The new mill consists of a jaw crusher, screens, log washer, and jigs. The property is opened by numerous pits and is expected to produce a mill feed running from 10 to 20 percent manganese. Winslow Products Company expects to employ 9 or 10 men when on regular production.

A small copper-leaching plant is being constructed by **Del Rio Minerals Company** at its property about a mile and one-half northwest of Helvetia, Arizona. The principal minerals are malachite and azurite in a limestone gangue. The plant will consist of crusher and rolls, crushing to ⅝ inch, two 100-ton leaching vats, each about 16 feet by 89 feet and 4 feet deep, and precipitation tanks. Three men are employed in the construction work under the direction of E. Arthur Mueller of Phoenix.



Miners Use Giraffe For High Scaling

An aerial platform, aptly named the Giraffe, is solving the New Jersey Zinc Company's problem of dealing with walls and pillars ranging up to 40 feet in height at the Friedensville, Pennsylvania mine. The Giraffe's hydraulically operated platform is mounted on a five-ton Diesel truck, and carries two boom sections capable of raising men and equipment up to 40 feet. The platform can be rotated in either direction. Controls for movement on the booms and turntable on the truck are installed on both platform and turntable. The Friedensville operation is using the device for removing loose rock from walls and roof to insure safe working places for miners. (See picture above.) It serves also in the installation of roof bolts for roof support and in loading high holes. Its specialty is putting miners in hard-to-reach places. The Friedensville mine went into production last year (MINING WORLD, May 1958, page 73). Crushed underground, ore is automatically loaded and raised to the surface by hoists equipped with all modern safety controls. As an accessory tool in creating safest conditions underground for miners and at the same time increasing production efficiency, the New Jersey Zinc Company finds the ingenious Giraffe invaluable.

McFarland & Hullinger of Tooele, Utah are making shipments of low-grade copper-silica ore from the old **Blue Bell** mine, near Mayer, Arizona, to the Hayden smelter for a fluxing material. The shipping rate is about a car a day, but plans call for doubling the output in the near future. McFarland and Hullinger took over the Blue Bell in April of this year, and since then have repaired and improved parts of the five-mile road which connects the mine with the main highway at Mayer. Mining is in progress in a cut along the out crop of a silicified band of copper-bearing material occurring in a broad shear zone. The main interest in the venture is said to be in the possible development of extensions of ore beyond the limits of the stoped areas in the upper part of the mine. Production from the Blue Bell is estimated at approximately $14,000,000, of which $1,000,000 was in gold, $1,200,000 in silver, and the remainder in copper—about 67,000,000 pounds. Developments at the mine consist of the main 1,500-foot shaft and more than 30,000 feet of underground workings, and five smaller shafts. The new operators propose to deepen a 30-foot shaft, located some 800 feet south of the main shaft, approximately 175 feet and to explore the shear zone at that horizon. Five men are employed in current operations under the direction of R. F. Ashlock, superintendent, of Prescott, Arizona.

A small plant to process diatomaceous earth is being completed at the **Whitecliffs** mine in the Mammoth mining district of Pinal County by **American Diatom, Inc.** of Phoenix, Arizona. The Whitecliffs group, 19 unpatented claims located about 11 miles southeast of Mammoth, is owned by Stanley M. Secrist of Tucson, but operated under a leasing agreement by American Diatom, Inc. The material is to be mined from an open pit by means of a bulldozer and shovel, loaded into trucks and hauled to the processing plant. Equipment at the plants includes a 10 by 20-inch jaw crusher, a 50-ton ore bin, a Pallman micron mill, a Liftmaster which separates the 250 to 325 mesh material and the dust (minus-325-mesh), dropping each product into separate bins for sacking. Capacity of the present plant is about six tons per hour, but plans call for installation of a larger mill as soon as demand for the products justifies additional capacity. The work is directed by Byron D. Young, vice-president and plant superintendent, of Oracle, Arizona.

J. G. Shotwell of Flagstaff, Arizona, is constructing a plant for crushing, grinding, screening, and classifying pozzuolana for use as an additive in the concrete for Glen Canyon Dam. The plant is located about 35 miles north of Flagstaff. Shotwell, formerly of Seattle, has contracted with B. B. Bonner, the owner of the pozzuolana deposits, to mine and deliver the material to the processing plant. The pozzuolana, a light buff-colored pumice, will be ground to 95 percent minus-325-mesh, trucked to the damsite, then mixed with cement in the proportions of ⅓ pozzuolana and ⅔ cement. The plant consists of three stages of crushing and grinding, a dryer, screens, air classification system, etc. Its rated capacity is 30 tons per hour. Deliveries to the Glen Canyon Dam are scheduled to start late this summer, probably in August. The plant and pit operations will employ at least 10 men.



Western Mineral Advisors Meet in Idaho

The Western Governors' Mineral Advisory Council, pictured above, met at Sun Valley, Idaho on July 8 and 9 at the invitation of the Idaho governor, Robert Smiley. The meeting was the third held by the Council since its formation meeting called by the then California governor, Goodwin Knight, in November 1955. Governor Smiley called the Sun Valley meeting under his authority as chairman of the Western Governors' Council. The objective of the advisory group is to recommend to the Western Governors a National Minerals Policy aimed at developing and maintaining a healthy mineral industry in the Western states. Sam Williston, Cordero Mining Company, Palo Alto, California, is chairman of the Advisory Council.

An exploration program is to be undertaken at **El Oro** mine in the Oro Blanco mining district of Santa Cruz County, Arizona, according to an announcement by George Williams, Geneva, New York, owner of the property. Williams stated that while the mine has produced some gold, the new work will be directed toward the copper possibilities. H. C. Davis, geologist, of Tucson, will direct the work.

CALIFORNIA

Union Carbide Corporation is reported to be drilling for asbestos in the area around Coalinga, California.

Four 3-man geological teams of the **Southern Pacific Land Company** are based this summer at Norden, Washington, and Oroville, all in California, and at Winnemucca, Nevada. Each team is mapping its district on a scale of 1:24,000.

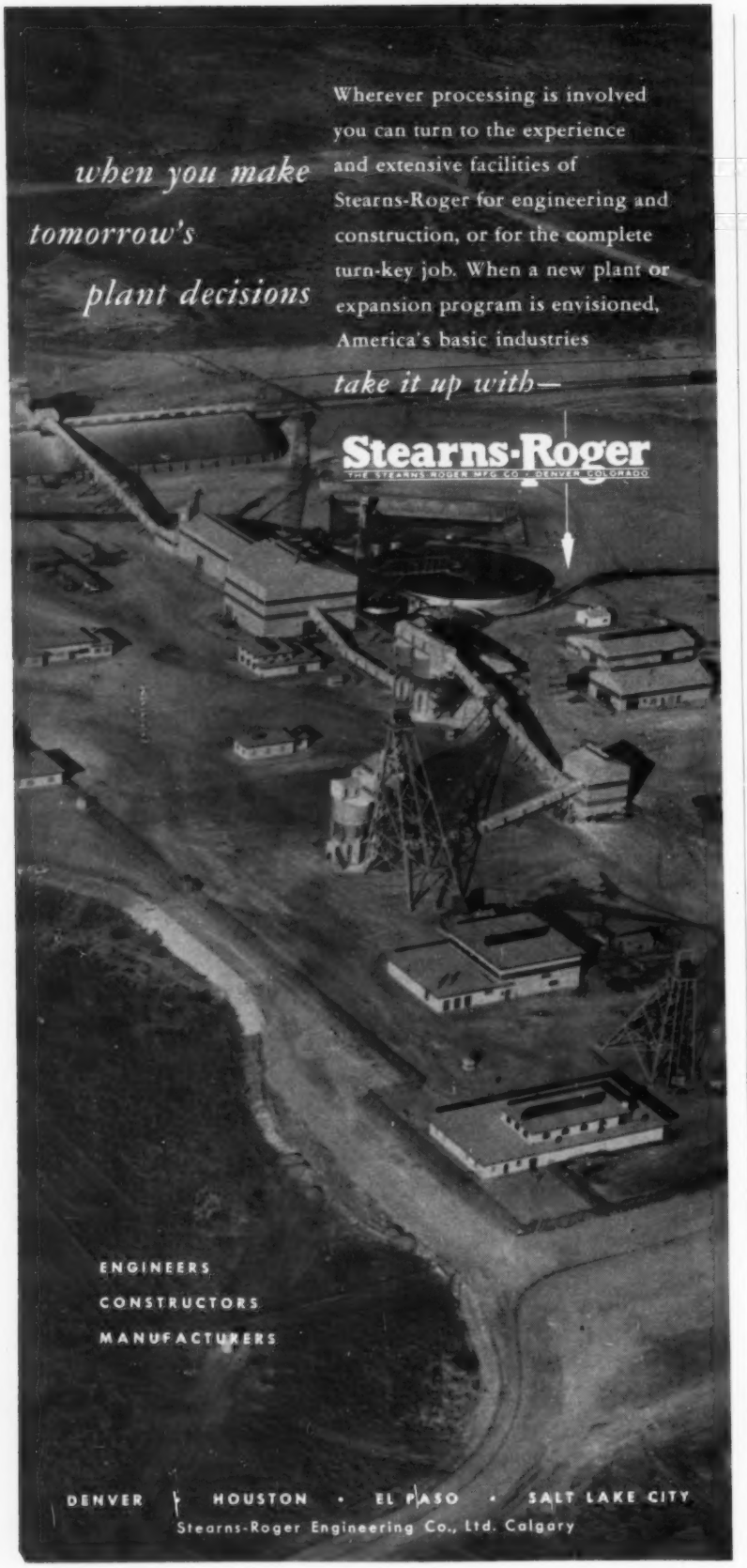
United States Borax & Chemical Corporation has made some changes in department locations. The Chemical Engineering Research Department has been moved from Anaheim, California to Boron, California, to be closer to the mine site plant. The New Product Development Department has been moved from New York to Anaheim in order to be convenient to the Research organization's staff and laboratory. Both departments are under the subsidiary **U.S. Borax Research Corporation.**

NEVADA

Consolidated Virginia Mining Company will resume mining on the Comstock Lode near Virginia City, Nevada. The firm has obtained a 10-year lease on the extensive local properties of the **Consolidated Virginia** mine where MacKay and Fair made a bonanza strike in 1874. Included are the old **Mexican, Ophir,** and **California** mines. The firm believes that earlier operators concentrated on high values and ignored ore of lower values which would be of commercial grade today. Therefore, immediate exploration work is planned rather than reopening of older deeper workings. Abraham Kendall and Bell E. Kendall own the claims, and Francis H. Knighton is president of the mining firm.

White Caps Gold Mining Company, reopening the old **White Caps** mine at Manhattan, Nevada, for antimony, has dewatered to the 1050 level and is continuing to the 1200 level. There an incline shaft will be sunk to the 1300 level which had previously been opened up by a winze but this is now caved bad ground.

A six-man special project team, headquartered at Lovelock, Nevada, is doing geophysical surveying for **Southern Pacific Land Company** in Buena Vista Valley. This is the area where previous drilling has indicated five iron ore bodies. It is about 25 miles east of Lovelock.



SOUTHWEST

The **Iron King** mine at Winnemucca, Nevada will be converted from open pit to underground operations. The work will be done by a new partnership formed by G. W. Delamare, general superintendent of **United Park City Mines Company,** and Will Austin, owner of the Iron King.

The **Nevada Minerals and Oil Corporation** has acquired the **Tonopah Belmont** mine, the adjacent **North Star** and **Montana** mining claims, and all facilities of the Desert Queen shaft of Belmont mines, including buildings, equipment, and 30 miles of underground rail track connecting the properties. Vic L. Smith of Tonopah, Nevada will manage the property. Under consideration is installation of a 240-ton million unit for concentration of silver, gold, and selenium ore. Actual mining will probably start on the 1,000-foot level of the Tonapah Belmont mine.

The **Mohawk** property in Esmeralda County, Nevada has been acquired by **United States Milling & Minerals Corporation** in a lease-purchase agreement negotiated with the owners—E. J. Shirley, L. H. Shirley, H. R. Humphrey, and S. M. Chiatovich. Extensive development work was done on the property by **Sunshine Mining Company** and later the **Bruhi Enterprises.** U.S. Milling has been doing considerable milling in the Silver Peak area, and will expand facilities to handle 100 tons of Mohawk ore per day.

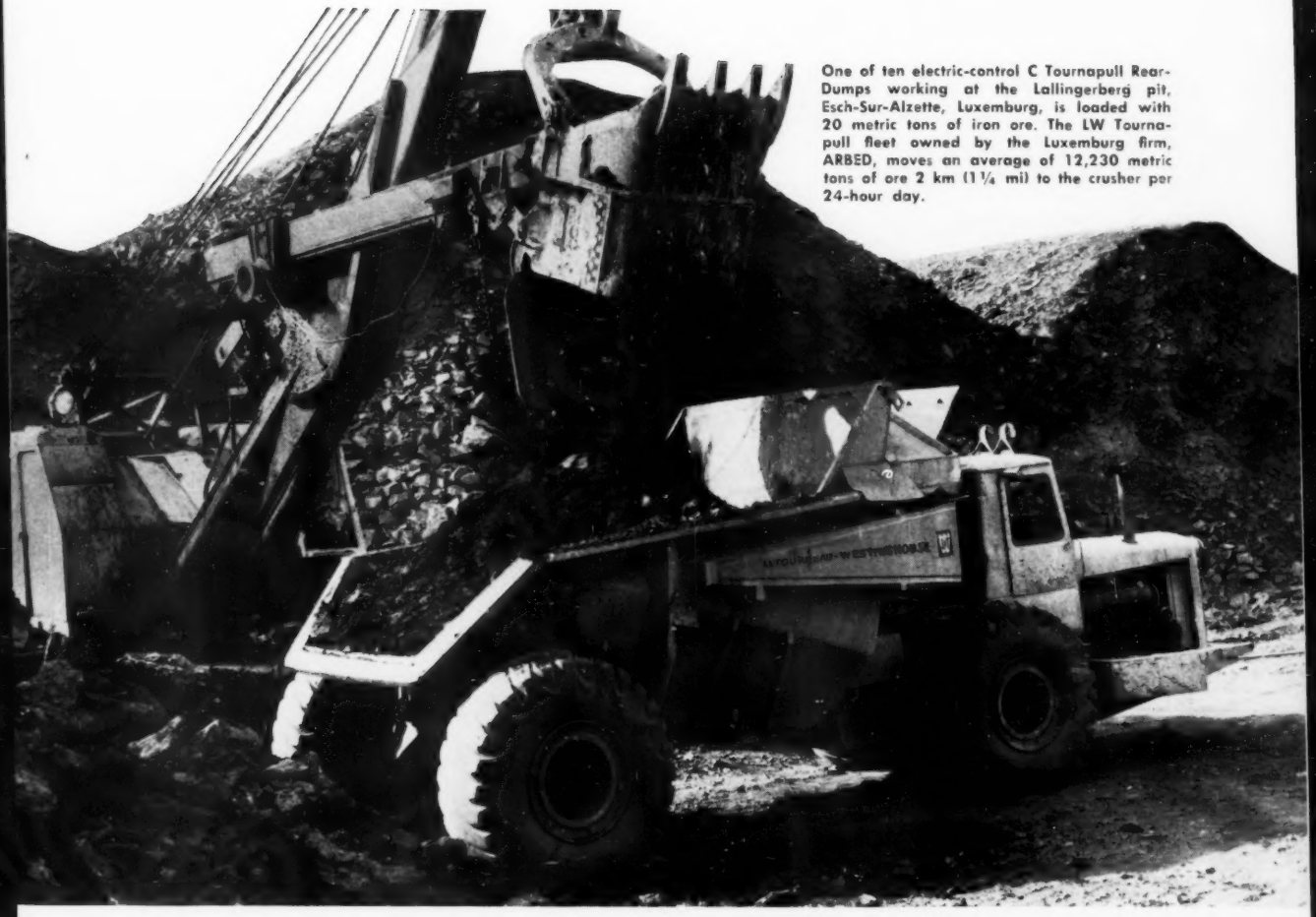
Getchell Mine Inc. is investigating the extent of a gold vein located south of the South Pit and north of the **Riley Extension** tungsten mine in the Getchell vein in Section 4. The vein was found during extensive exploration work carried on over the past year to develop oxidized gold ore reserves. The ore body found contains both oxide and sulphide gold ore. The company acquired additional mining property over the past year and now holds 277 mining claims by location, possessory right, and owns 17,523.6 acres of patented mining property. This property is contiguous with a total of approximately 23,064 acres located in the Potosi mining district, Osgood Mountain Range, Humboldt County, Nevada. A portion of the gold plant is available for immediate treatment of gold oxide ore when sufficient tonnage is developed, and no new equipment will be required.

The **Small Business Administration** bid $100,000 for the properties of **Copper Canyon Mining Company** near Battle Mountain, Nevada in a U.S. Marshal's sale in Austin, Nevada. Sale must be confirmed by the **U.S. District Court** at Carson City. The property was first acquired by the **Reconstruction Finance Corporation** under a default judgment in March 1957 and later turned over to the Small Business Administration when the RFC was dissolved. It is believed the property may be resold at public auction later.

NEW MEXICO



United States Potash Company, division of **United States Borax & Chemical Corporation** has had a three-week shut-



One of ten electric-control C Tournapull Rear-Dumps working at the Lallingerberg pit, Esch-Sur-Alzette, Luxemburg, is loaded with 20 metric tons of iron ore. The LW Tournapull fleet owned by the Luxemburg firm, ARBED, moves an average of 12,230 metric tons of ore 2 km (1¼ mi) to the crusher per 24-hour day.

• Works more productive hours

• Moves more tonnage

• Lowers costs

Rugged, simplified construction is one big reason why LeTourneau-Westinghouse Tournapull Rear-Dumps keep working efficiently day after day, year after year, to help pit owners cut costs. Check these important LW Rear-Dump features:

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• **Front-wheel drive and electric kingpin steer**—eliminate a great number of trouble-causing parts. No longer must power be carried back to the rear through a long drive-shaft, with its bearing, universal joint, and lubricating problems. And no longer is steering handled by small front wheels subject to misalignment as they try to get out of ruts.

• **Big, low-pressure tires**—absorb the shocks of off-road travel and shovel loading, eliminate the need for springs.

• **Electric-control system**—is never affected by excessive heat, cold, moisture, or dust. Point-of-action electric motors keep cable requirements low.

• **Exclusive power-transfer differential**—reduces costly wear on tires, clutch, and transmission caused by spinning wheels in slippery or loose footing—lets you work in difficult conditions where other competitive units bog down.

Advantages like these—plus short radius turns, fast, clean dump, giant air brakes, excellent visibility—add up to high production and low costs.

LeTourneau - Westinghouse Rear - Dumps are available in 3 sizes: 10, 20, 31¾ metric tons. LW scraper, bottom-dump, and crane trailing-units are interchangeable behind the same Tournapull prime-mover. Write for complete details.

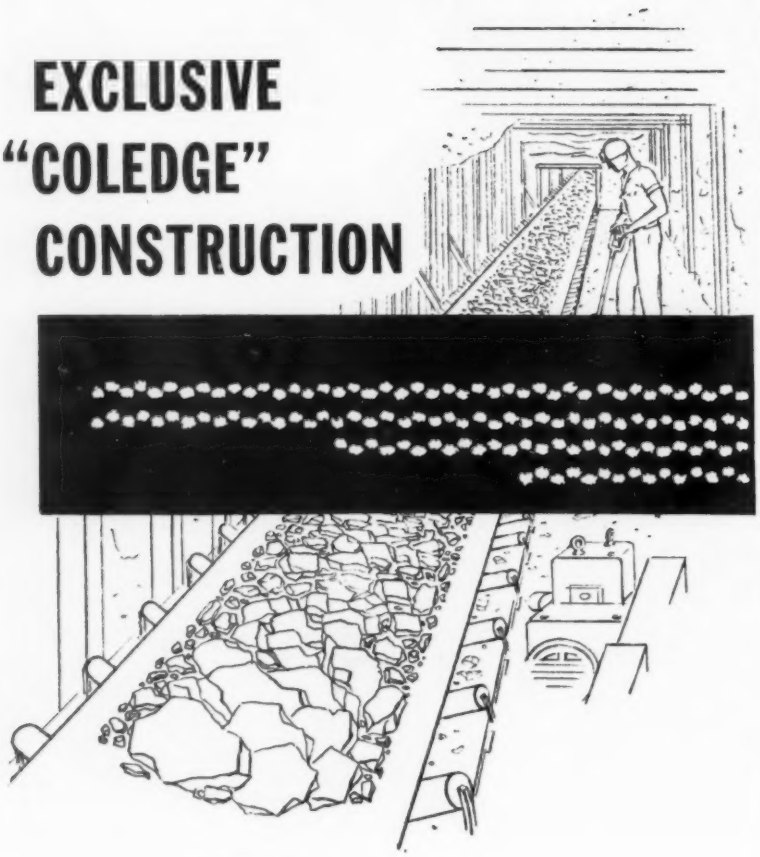
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down of its operations at Carlsbad, New Mexico. The period was from July 13 to August 2. During this time, the company has been able to make some major repairs that cannot be made while the plants are in operation.

International Minerals & Chemical Corporation's Potash Division at Carlsbad, New Mexico was shut down from July 4 to July 19. Full production got underway again on July 26, though the hydrochloric acid-magnesium oxide section of the chemical plant continued to operate during that period in order to keep up with urgent market commitements. In addition to scheduled maintenance work was carried on during the shutdown, several major projects were carried out. In the refinery, a new Bird-Humboldt centrifuge was installed to replace one of the older types in the langbeinite circuit. A new telephone cable was installed in No. 1 shaft, and the rotary dump in the No. 1 shaft station was completely rebuilt. New low-height mining equipment has been lowered to the 900-foot levels and placed in operation.

After several months of preliminary field mapping and sampling, plus some exploratory drilling, a second phase of limited underground exploration has been started by **Sunshine Mining Company** at the lead-barite-fluorspar prospect near Socorro, New Mexico. Surface trenching, preparatory to driving a 300-foot crosscut through the most favorable zone, is under way.

Phillips Petroleum Company has purchased three mine properties in the area around Grants, New Mexico from the **Food Machinery and Chemical Corporation.** The mines are the **Faith**, the **Doris**, and the **Doris Extension.** All are relatively small sized properties and reportedly were purchased to have an immediate ore supply on hand for the firm's mill at Grants.

COLORADO

Four Corners Uranium Corporation and **Four Corners Oil & Gas Company** have merged their interests and formed the **Four Corners Oil & Minerals Company.** Head of the new firm is Eugene H. Sanders of Denver, founder and president of Four Corners Uranium. The new company will continue its uranium mining program in Colorado, Utah, Wyoming, and New Mexico. The uranium company had grossed $1,107,176 from 51,612 tons of uranium ore in 1958, according to its annual report. In addition to gas and oil holdings, the new firm has also acquired oil shale lease applications on eight sections of land in Sweetwater County, Wyoming, near Green River.

American Metal Climax Inc. has purchased property from Walter Byron of Kokomo, Colorado for $105,000. The property is in Kokomo and in Recen, and undoubtedly is to be used as disposal area for tailing from the **Climax Molybdenum Company** operations. Mr. Byron also gave American Metal Climax an option to purchase the **Pacific** placer for $100,000.

A roadbed test is being made in Climax, Colorado by **Climax Molybdenum**

Pivot-steer haulers, tractor-on-rubber, help unusual tunnel project in Norway

At Radal near Bergen, Norway, the Fana Kommune is accomplishing a double objective in cutting a series of tunnels into a nearby mountain. Rock obtained from this operation is used on the community's road projects. And the tunnels, when completed, will serve both as storage facilities and as a direct route to sand and gravel deposits on the other side of the mountain.

Two of the most important machines used in this activity are a LeTourneau-Westinghouse Tournatractor and a Tournapull Rear-Dump. Illustrated here are some of the ways the advantages of these units are proving helpful.

LW Tournapull Rear-Dumps are available in 3 sizes: 10, 20, and 31¾ metric tons capacity. The 218-hp Tournatractor has torque converter with speeds to 27 kph (17 mph). Our world-wide distributor organization assures prompt and efficient parts and repair service. Write for complete information.



In cramped loading quarters deep inside tunnel, shovel fills 10-metric-ton LW Rear-Dump with heaping load of rock. Short turns with electric, 90° pivot-steer prove a major advantage in positioning at shovel and hopper, as well as for maneuvering in all tight spots underground. Mr. Hoie, engineer in charge, says, "We like Tournapull's short turn radius. In many cases it eliminates the need to build turntables." With body in travel position, D Rear-Dump makes continuous 180° turn in 7.5 m (24′ 8″), in dump position in only 5.7 m (18′ 8″).



LW Rear-Dump empties load of rock into hopper. Fana Kommune reports the Tournapull requires less time for maintenance, and in the 3 years they have owned the "D", it has not required any major repair.



The 138-hp D Tournapull leaves tunnel as it starts haul to the crusher. The entire 450-m (1476-ft) haul route is narrow and winding, with 5 and 7% adverse grades. LW Rear-Dump's big, multi-disc air brakes, which provide up to 4 times more braking surface than most haulers have, give operator confidence to use high speeds in hilly or restricted quarters.

The high-speed Tournatractor quickly cleans up around shovel. Fana Kommune Contracting group states complete satisfaction with Tournatractor's performance. The 218-hp rubber-tired tractor can be driven to new assignments, across air-drill hoses, electric-cables, railroad tracks, pavement, without damage.



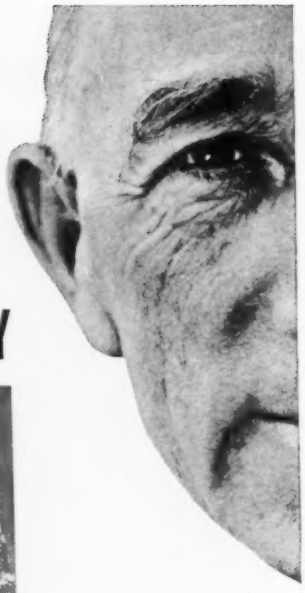
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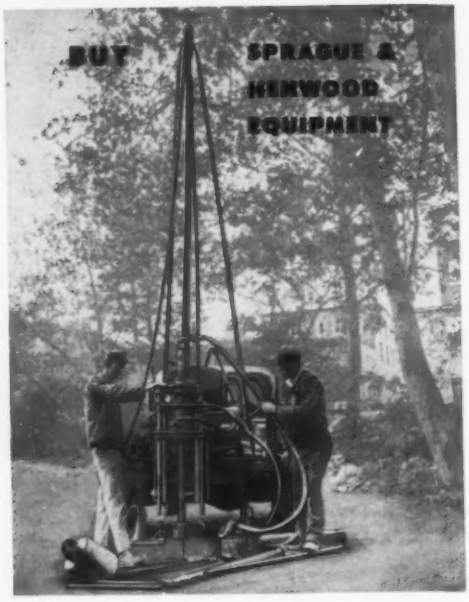
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ROCKY MOUNTAIN

Company. The firm is experimenting with Orzan AL-50 made by the **Crown Zellerbach Corporation** to see if it will provide a better road bed, and also eliminate problems of dust and extensive maintenance. (See MINING WORLD, July 1959, page 47, for a description of the use of Orzan by **Anaconda Company** at its Yerington, Nevada property.) The road material being used in one section is reject sand from the Climax underground concrete program, and in another section tailings from the Climax milling operation are being used. This is then treated with a water solution containing Orzan. Since Orzan is dissolved by water, a seal coat of asphalt with neophrene will be sprayed over the road surface to protect from snow and rain. The final step will be to spread aggregate chips over the sprayed asphalt.

Building construction has started at the Silverton, Colorado property of **Shenandoah Ltd.** Two shop and warehouse buildings are being erected by a Grand Junction contractor at the tunnel site in Gladstone. Slabbing of the Gold King Tunnel has been underway for some time, but large-scale slabbing operations have been held up until completion of track laying. The tunnel has been found to be much larger at the portal than first anticipated. It is 9 to 10 feet wide by seven feet back. New mine foreman is Charles D. Carpenter of Crested Butte. He replaces Roy Pattie who resigned.

UTAH



During the first five months of 1959, **Hecla Mining Company** sold 19,084 tons of uranium ore assaying 0.820 percent U_3O_8 from the **Radon** mine in the Big Indian district of Utah. The mine is operated by Hecla for **Radorock Resources Inc.** and so only 25 percent of these ore sales was credited to Hecla's account. In addition, a total of 7,549 tons of ore assaying 0.530 U_3O_8 was mined and stockpiled on similar accounting basis. Another 2,739 tons assaying 0.353 percent was mined and sold from the nearby **Hot Rock** group, all of which was for the Hecla account. Hecla has the right to recover exploration and development costs at the Hot Rock before sharing proceeds from ore sales with Radorock. Since the AEC has limited the amount of ore to be shipped from producers in this district, the ore stockpiled represents in excess of what Hecla can sell under the limitation.

New Park Mining Company plans to undertake a major geophysical reconnaissance of its Park City district property after completion of the current $715,185 DMEA exploration contract in its **Mayflower** mine. Involved in the latter is the driving of a 6,000-foot drift to explore areas of copper mineralization in the west portions of the New Park properties. Now under consideration is preparation of a three-dimensional map of the entire Park City anticline. Other active companies in the area would be asked to participate financially because the resulting data would be valuable to all operators in the district. The geochemical work has been completed and some geophysical work, too. The next step would be major geophysical work with selected diamond drilling in target areas.

Where quality is a habit

International Oil & Metals Corporation is stepping up its uranium mining operations after having substantially expanded the extent of its ore body on its property in the Big Indian district of San Juan County, Utah.

Diamond drilling has opened up ore zones on the 2,000-foot level of the **United Park City Mines Company's** lead-zinc mine, 200 feet below the present shaft bottom. Consideration is now being given to sinking an internal shaft to the ore zone. This is in the **Ontario** section of the mine.

Kennecott Copper Corporation is considering an increase in capacity of its electrolytic smelter at Garfield, Utah by an additional 7,000 to 8,000 tons monthly. The refinery now handles between ⅔ and ¾ of the total copper produced at the Garfield smelter. By 1965, when existing contracts with **American Smelting and Refining Company** end, Kennecott will have a refining capacity capable of treating all but 7,000 to 8,000 tons monthly of its output of smelter copper. This amount of needed new capacity could be divided between Garfield and the new refinery at Baltimore, Maryland.

The **Atomic Energy Commission** will close its uranium mill at Monticello, Utah on or about January 1, 1960. The mill then will be maintained in a standby condition. The mill is being operated by the **National Lead Company, Inc.** under contract with the AEC. It presently treats ores at a rate of about 300 tons per day which is considered minimum economic operating rate. Ore deliveries have averaged only 100 tons per day in recent months, according to the AEC, and a substantial part of mill feed has been drawn from accumulated stockpiles. To operate at the 300-ton rate after December 31, 1959, the AEC would have to purchase a substantial quantity of ore in excess of programmed requirements, creating problems in other uranium areas. With closing of the mill, all domestic ore processing will then be carried on by private industry through the 22 mills now operating in the western states. They have a total capacity of 20,650 tons a day.



Colorado's Centennial

In celebration of Colorado's Centennial, 1859 to 1959, the famous Gold Prospector on top of the Mining Exchange Building in Denver has received a new gold suit after 68 years of service. The Denver Mining Club has leased the old stock exchange room in the historic building and has set up a "Hall of Mining Progress" which displays mineral specimens, photographs, and other mementos of mining —old and new.

WYOMING

Fremont Uranium Corporation of Lander, Wyoming, has signed a contract with **Pennington Construction Company** of Ft. Collins, Colorado, for the Colorado firm to mine Fremont's **Sturlin** gold placer claims near Jackson, Wyoming. The claims cover some 2,840 acres 24 miles southwest of Jackson, at the confluence of Bailey Creek with the Snake River. The claims reportedly contain about 50,000,000 cubic yards of ore. Arrangements and proceedings with Pennington have been headed by Orville Murray, field superintendent for Fremont.

Leslie B. Worthington, president of **Columbia-Geneva Steel Division, U. S. Steel Corporation,** reports that officials of his company are now thinking of 1960 as the date for beginning the proposed taconite upgrading mill at Atlantic City, Wyoming. He points out that repeated postponements of target dates were due to the fact that the company must proceed with care not to install equipment that would be almost outmoded by the time it was in operation, because of the rapid pace of technology in the field. It was reported that each of Columbia-Geneva's three blast furnaces at Provo, Utah, would be increased from 1,300 ton-per-day capacity to 1,500.

IDAHO

Deepening of the main shaft at the **Galena** mine in the silver belt of the Coeur d'Alene mining region, Shoshone County, Idaho, has been completed past the 4,000-foot point, and a new station is being cut for a 4000 level. Satisfactory results are reported in 3700 level development of the main silver vein. The surface adit has been turned westerly to pass under Lake Creek and reach the site of a new ventilation shaft. A new ore bin is being planned. J. C. Kieffer of Wallace is manager of the Northwestern mining department of American Smelting & Refining Company which is operating the mine under a long-term lease.

Raising is under way on two commercial oreshoots at the **Conjecture** silver-lead mine, Lakeview Mining District, Bonner County, Idaho. They were reached on the new 700-foot level from a new shaft put down by the operating **Federal Uranium Corporation.** Drifting toward the ore zones is under way on a three-shift, six-day week basis on the lower 1000 level. R. W. Neyman of Salt Lake City is president and general manager of Federal.

At the **Rainbow** property in the silver belt west of Wallace, Shoshone County, Idaho, **Hecla Mining Company** is crosscutting southerly from its 3,000-foot level to explore an area south of the Polaris fault, a part of which is in the **Triangle** group of claims. The Triangle property is owned by **Day Mines, Inc.** and **American Smelting and Refining Company,** lessees of the **Galena** mine in the adjacent **Vulcan** property. Hecla would own 70 percent of production.

American Silver Mining Company and **Silver Standard Mining Company,** Shoshone County silver belt firms, have signed a supplemental operating agreement with **Hecla Mining Company,** which took over the operating contracts of **Polaris Mining Company** in a merger last fall. Hecla has agreed to perform at least $25,000 worth of drilling exploration within the 1959-60 period. Longest holes will penetrate 1000 feet south of the two-mile East Exploration lateral Polaris drove from the 3,000-foot level of its **Silver Summit** mine.

Silver Buckle Mining Company is planning a diamond drilling program this summer on its holdings in the silver belt just west of Wallace, Shoshone County, Idaho.

An open pit mining operation is being considered at the gold-silver iron property of **Wonder Lode Claims, Inc.,** in the Leesburg Quadrangle, Lemhi County, Idaho. Fred H. Snook of Salmon, is secretary-treasurer.

Diamond drilling of the **Surprise** group of lead-silver-zinc claims southwest of Clark Fork, Bonner County, Idaho, is planned by the owner, Edward B. Clark of Clark Fork.

Installation of a new type portable ore mill is planned at the **Liberty Gem** mine near Hailey, Blaine County, Idaho. Designated "Ore Bee," the mill was invented by Newton Matthews, Hailey mill man. The mill is being manufactured by **Jeffry Brothers Company** of Chico, California.

Extensive geophysical exploration will be carried out this summer in the Bayhorse mining district south of Challis, Idaho by **Umont Mining Company.** Umont, under the direction of Dooley P. Wheeler, Jr., general manager, started field work last fall and found extensive undeveloped mineralization in the old district which has produced over $15,000,000 worth of lead, silver, and copper. **Sidney Mining Company** of Kellogg, Idaho is a partner in the exploration project.

MONTANA

Production at the **Jack Waite** lead-zinc mine on the Montana-Idaho border so far this year has been at a rate of about 16,000 tons annually, compared to less than 10,000 tons mined last year. **American Smelting & Refining Company** spent $127,000 on exploration and development work last year. Philip A. Borelli of New

NORTHWEST

York City is president of **Jack Waite Mining Company.**

Anaconda Aluminum Company has decided to increase production at Columbia Falls, Montana because of the improved outlook for sales and a general pickup in industry conditions. Thirty potlines have been reactivated, bringing plant operation to about 88 percent of capacity or an annual rate of 57,000 tons. Since July 1, 1958, the plant had been functioning at only 75 percent of capacity.

Thorium concentrates are being produced by **Sawyer Petroleum Company** at its leased mill at Glenn, Montana. Ore is mined by Sawyer at its property on the Montana-Idaho border and trucked to the mill. Concentrate is sold to **Continental Ore Corporation** under contract. E. W. Sawyer, Jr. is company president.

A Montana charter has been granted the **East Pacific Company** of Helena. Capitalization was set at $1,000,000 by company directors, Rodney Kurth, Great Falls; Ted A. Tiegen, Bozeman; and Paul T. Keller, Helena.

WASHINGTON

Development of seven properties in Washington's Stevens, Ferry, and Chelan Counties is planned by a new Colville firm, **Triton Mining Company.** Good platinum assays are reported at the **Kelly Camp** tungsten mine in Ferry County. Other holdings are the **Joe Creek,** 10 miles northeast of Colville, Stevens County, silver, lead and zinc; **Nancy Creek** group and adjoining **Schuerman** group west of Kettle Falls in Ferry County, uranium; **Lucky Sunday,** Ferry County, uranium; **Pioneer,** 14 miles northeast of Colville, Stevens County, lead, zinc, silver and gold; **Tie Camp** group, Ferry County, uranium; and **Morse** lease, Chelan County, silica. The corporation is acquiring a 75-ton mill at the Pioneer and a 24-ton mill at the Kelly Camp. Darrell A. Newland, Colville, is president, and Cline E. Tedrow, Spokane, consulting engineer.

In Pend Oreille County, Washington's **Jim Creek** lead-zinc area, **Utahcan, Inc.** is completing tailings ponds preparatory to starting up its new 150-ton daily capacity concentrator. Late spring snows, rain, and mud held up construction of the ponds. L. L. Lorang, Spokane, is president.

State Land Commissioner Bert Cole at Olympia, Washington received 27 applications on the opening day for bidding on exploration leases covering black sand deposits on an Olympic Peninsula tideland strip extending from the Queets River to Cape Flattery.

Bear Creek Uranium Company had shipped 800 tons of ore from its shaft and winze operation near the **Daybreak** mine in the Mount Spokane District of Washington at last report since resuming operations in the spring. The winze is being sunk on ore which dips northerly at 14 degrees from the shaft. The firm contracted to ship 300 tons monthly to the Ford, Washington uranium mill of **Dawn Mining Company.** Oscar Herem of Elk is mine supervisor.

Ore upgrading equipment is being experimented with at the Mount Spokane properties of **Daybreak Uranium, Inc.** A shaker and one-inch screen was installed initially with the objective of dislodging and recovering autunite coatings from otherwise worthless rock. Mining operations were resumed in May from both the old pit and a new one, and at last report about 500 tons or ore had been trucked to the Ford, Washington uranium processing mill. Kae Sowers of Opportunity is secretary-treasurer.

The **United States Bureau of Land Management** is advertising more than 1,000 mining claims in the Colville Indian Reservation, Stevens County, Washington, as part of a program to clear title to 12,000 claims filed before September 19, 1934, when the reservation was closed to mineral entry. The government claims the claims are nonmineral, do not contain sufficient mineral for valid discoveries, or are not legally marked. W. F. Meek is manager of the Bureau's Spokane land office.

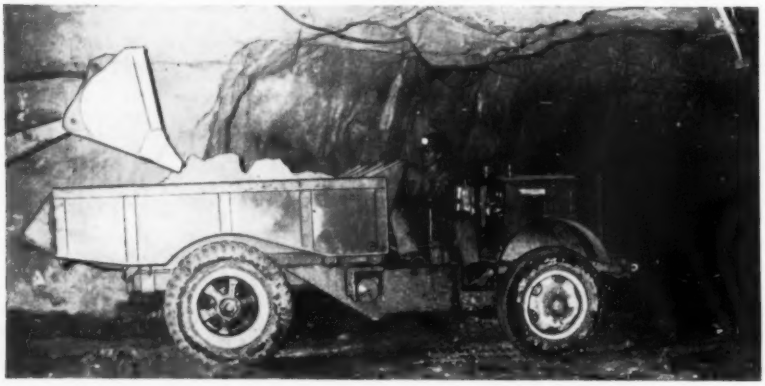
Wind River Mining Company of Portland, Oregon has finished installing a 50-ton pilot plant on its property in Skaminia County, Washington, near Stevenson. The firm plans to mill gold and silver ore from an area discovered last year on its 21 claims. Everett N. Philpott is president and general manager.

Substantial savings in mine development costs are being made at the **Grandview** mine, Pend Oreille County, Washington, through use of a new mining machine known as a "Transloader." The machine is a speedier, more mobile model of the "Gismo" first used in the Metaline district mine owned by **American Zinc, Lead and Smelting Company.** Rubber-tired wheels are used instead of crawler tracks on the new model. Capacity operations in 1958 yielded 16,076 tons of zinc-lead concentrates.

The Gold Dollar ore body of **Day Mines, Inc.,** in the Republic district of Ferry County, Washington is being mined actively by the lessee, **Knob Hill Mines, Inc.** Ore reserves above the 10th level are well blocked out and are "very satisfactory." Production totaled 47,226 tons in 1958. Henry L. Day of Wallace, Idaho is president of Day Mines.

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CENTRAL STATES

Eagle-Picher Company has recalled many of its workers for its zinc smelter at Henryetta, Oklahoma and has resumed production on an eight-furnace block. Smelter production had been cut back to six block operation earlier in the year because of the unstable zinc market. The smelter had resumed operations in December 1958 on a reduced scale with six furnace blocks after a nine-month shutdown. In February this had been stepped up to 10 blocks; then in April, the cutback to six blocks was considered necessary. The firm's Bird Dog mill northeast of Cardin, has been reopened on a tem-

porary basis. It will be used to retreat slimes.

The **Eighth National Clay Conference** will be held on the campus of the University of Oklahoma at Norman, on October 12, 13, and 14, 1959. Sponsor of the meeting is the Clay Minerals Committee of the National Academy of Sciences-National Research Council. A field trip is planned to visit clay occurrences of geological interest, probably in the Wichita Mountains. Two symposia of invited papers will be held on the subjects of "Clay-Water Systems" and "Clay Mineral-Geochemical Prospecting Methods". There will also be general sessions of contributed papers.

EASTERN STATES



The **Aluminum Company of America** has reopened a second potline at its smelting plant in Alcoa, Tennessee. The additional potline was started to meet the increased demand for aluminum. The increase amounts to a 10 percent step-up or about 12,000 tons annually. All of the bauxite smelted at Alcoa, Tennessee, is shipped by rail from various ports on the Gulf of Mexico. The principal reason for locating the smelter in East Tennessee is an abundance of cheap electric power.

Stauffer Chemical Company of New York and **Victor Chemical Works** of Chicago have agreed in principle to a merger on a share-for-share basis. If approved by the stockholders, Victor Chemical will become a division of Stauffer. Victor's business is based on phosphorus and phosphates, while Stauffer has in recent years increased its interest in phosphorus chemistry with a phosphate-based insecticide, superphosphate fertilizer, and research on boron-phosphorus high temperature plastics.

The rush to get refined zinc into steel plants before the original deadline for the steel strike on June 30th helped push June shipments of zinc to a record high. Total shipments of slab zinc in June were 102,162 tons, an increase of 16,814 tons over May when 85,348 tons were shipped. In June of 1958 the shipments had totaled only 54,658 tons.

Mining operations have been renewed at the property of **Virginia-Carolina Chemical Corporation** in Bartow, Florida, despite continuance of a strike by phosphate workers. The "Busy Bee", the firm's 20-yard capacity dragline is working the company's **Clear Spring** mine to replenish the stockpile. The bucket dumps its load of phosphate matrix onto a pile, where high pressure streams of water sweep the ore into a sump. From there, it is piped a mile south to the washer, where the ore is separated from the sand.

The **General Services Administration** will buy no more domestic manganese ore after August 5. The government's stockpile is expected to reach its 28,000,000-long-ton limit by that date. The program started in 1952.

The **General Service Administration** received no responsive bids for the purchase of surplus synthetic cryolite. It will consider offers on a negotiated basis for or portions of the 22,423 short tons of the material presently stored at Cairo, Illinois. Write to George K. Casto, **Defense Materials Service,** GSA, 18th and F Streets, N.W., Washington 25, D.C.

The feldspar mines and plants of **Whitehall Company, Inc.** (Bon Ami Company, Inc.) at Spruce Pine, North Carolina have been sold to John and Sam Phillips, and J. R. Beam of Spruce Pine. For 25 years Whitehall supplied feldspar to the Bon Ami Company for use in its cleaning powder.

IRON RANGES

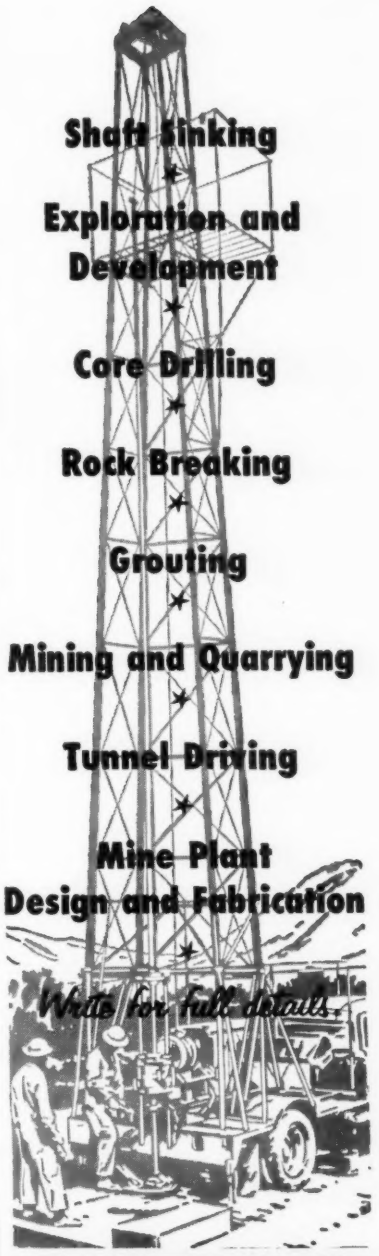


Minnesota Governor Orville Freeman signed the Semi-Taconite Bill into law on July 2. This bill provides special tax rates on semi-taconite iron mining similar to the law passed in 1941 regarding magnetic taconites. The **M. A. Hanna Company** has been planning a semi-taconite pilot plant for experimentation on West Mesaba Range ores. The plant will consist of reduction roasting, heavy media, and flotation sections. Semi-taconites are classified by their non-magnetic, low-grade qualities. The majority of this category of iron ore occurs in the western third of the Mesaba Range. It is expected that many companies will proceed with experimental work of the various types of ore now that special tax legislation has been authorized.

The Wisconsin Senate concurred in an Assembly bill to permit taconite mining companies in northern Wisconsin to withdraw large quantities of water from lakes and streams for processing of the low-grade iron ore. The bill would allow the withdrawal of water under State **Public Service Commission** permit until the processing of ore covered in the original permit application was completed.

Pickands Mather & Co. is operating 15 mines and plants in the Lake Superior district this season. They include the five underground properties on the Gogebic Range—the **Sunday Lake, Geneva, Cary, Peterson,** and **Newport**. On the Menominee Range, the **Buck** mine is in operation, and the Volunteer open pit has been reopened on the Marquette. On the Mesabi Range, six open-pit mines are shipping (as of June 30)—the **Embarrass, Scranton, Mahoning, Bennett, Danube,** and **Tioga No. 2** mines. Two mines on the Cuyuna Range are the **Mahnomen** and **Rabbit Lake,** both open-pit operations. **Erie Mining Company**'s taconite plant at Hoyt Lakes has gradually stepped up production of high-grade pellets and it now operating at close to its 7,500,000-ton design capacity.

A hydraulic dredge has been installed at the **Jessie H.** mine near Grand Rapids, Minnesota, to remove overburden from newly acquired properties adjacent to the mine. This is the only mine on the Mesabi Range to utilize a dredge for stripping in recent years. The dredge has a capacity of 350 cubic yards of material an hour and will be used to strip overburden from the entire deposit. R. N. McGiffert is general superintendent of the mine.



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INTERNATIONAL NEWS

Bureau Completes Surigao Iron-Nickel Survey; Issues Report, Estimates Development Costs

After four years of intensive investigation, the Philippine Bureau of Mines and the United States International Cooperation Administration have issued a final report on the nickel-iron deposits of Nonoc Island, off Surigao. The deposits lie within the bounds of Parcel II of the Surigao mineral reservation. About 4,500 hectares of this area is reported blanketed to depths of one to 18 meters by nickel-bearing ferruginous laterite, a porous residual material derived from the serpentine that underlies it.

Test pitting and auger drilling at 100-meter intervals over 2,500 hectares of this area, covering the laterites of Nonoc, Awasan and southern Dinagat islands, proved that 97 percent of the penetrated material contained iron, nickel and cobalt.

Estimated ore reserves, classified according to grade, are reported as follows:

1. Iron ore–104,000,000 metric tons containing 47.55 percent iron and 0.79 percent nickel.

2. Iron-nickel ore–26,000,000 metric tons containing 43.36 percent iron and 1.48 percent nickel.

3. Nickel ore–13,000,000 metric tons containing 14.91 percent iron and 1.70 percent nickel.

Pyrometallurgical tests on 300 tons of typical Nonoc ore reportedly show a 90 percent recovery of nickel and an 80 percent recovery of cobalt can be expected from all ores, and than 80 percent of the iron in "iron ore" and "iron-nickel" ore can be recovered and processed into low-alloy mild steel. Recoverable iron amounts to 48,500,000 metric tons, recoverable nickel–1,412,000,000 short tons, and recoverable cobalt–99,000 short tons.

A major portion of the report is devoted to consideration of a plant for treating the ores by a new process worked out in cooperation with the U.S. Bureau of Mines. The recommended plant would treat initially 2,000 tons of ore a day, gradually increasing the amount to 6,000 tons. Cost of the plant would approximate Pesos 105,321,000 ($52,660,500), half of which would be in foreign exchange.

Estimated total cost of processing the ores, including cost of electricity, coal, bunker fuel, electrodes and labor, would be about Pesos 68 per ton. Breakdown of amounts and unit costs of such major expense items follow:

(1) Electric power-1629 kw-hr at Pesos 0.0108 per kw-hr.

(2) Reductant (coal)–0.347 ton at Pesos 25.00 per ton.

(3) Eletrode (soderberg paste)–28.145 pounds at Pesos 0.005 per pound.

(4) Electrode (graphite)–1.66 pound at Pesos 0.40 per pound.

(5) Fuel (bunker, Diesel, gasoline)–13.8 gallons at Pesos .28 per gallon.

(6) Labor–0.63 man-days at Pesos 9.45 per man-day.

According to the report, the estimated market value of recovered nickel, cobalt, and steel would be around Pesos 86 per ton. Using the estimated cost figures outlined above, this would allow a profit margin of Pesos 18. Development of the property will be open for bidding.

Japan Sets Goals To Meet Industrial Metal Needs

The Japanese Ministry of International Trade and Industry has established a copper, lead, and zinc production plan for the fiscal year, April 1, 1959 to March 31, 1960. The figures are based on estimated market requirements for this period. Metal mining and smelting companies are scheduling operations to meet this goal.

Copper concentrate output is schedule at 476,462 metric tons, containing 79,790 metric tons in metal content. Other copper sources would be 2,460 metric tons of copper-bearing ore and 3,709 tons of cement copper; therefore, the total output would be 83,593 metric tons of copper. Lead concentrates' goal is 57,970 metric tons, containing 37,165 metric tons of lead, while zinc should total 150,686 metric tons.



CHILE–**Cia. Minera Santa Fe** plans to undertake development of the **El Laco** iron deposit in the Province of Antofagasta at a cost of about $300,000,000. **Bethlehem Steel Company** will participate in the project. Preliminary work and study are being carried on to determine the site for a new mechanized loading dock at the port of Antofagasta and the possible routing of a railway from the deposit. Before completion of the project, it is expected that some 100 kilometers of rail line will have to be laid over some of the world's most rugged terrain at an altitude of 10,000 feet. In total, it will be necessary to transport the ore for over 400 kilometers to port.

SURINAM–A 66,000-square-mile magnetic aerial survey of Surinam's mineral resources is being undertaken by the **Aero Service Corporation** of Philadelphia, Pennsylvania, and its affiliate, **Canadian Aero Service Ltd.** of Ottawa. Photo-geologists are studying existing aerial photos taken in the past over about 80 percent of the country in order to decide on promising areas for detailed aerial geophysical surveys. The study is being undertaken by the government in the hope of finding iron, uranium, and other minerals. The country is already one of the world's largest suppliers of bauxite. The government is actively negotiating for further financial aid and is encouraging long-range development of these resources through private enterprise.

GUATAMALA–Part of **Bunker Hill Company's** $240,000 metals exploration fund for 1959 is earmarked for the joint lead-zinc venture with **W. R. Grace and Company.** A lead deposit about 150 miles north of Guatamala City is presently being explored by the two companies.

PERU–**Cerro de Pasco Corporation** has almost completed its modernization of its lead sinter plant. Next project will be the driving of a pair of parallel tunnels, each six miles long, to provide both ventilation with fresh air and drainage of hot mine water at Casapalca ore body. This will then permit mining of the Casapalca ore body at greater depths.

CHILE–**Compagnie Miniere du M'Zaita** has decided to reopen its Chagres smelter later this year. Located between San Felipe and Llay-Llay, this smelter has been closed since 1945, mainly because there was a need for modernization of the plant at a time when it was not convenient financially to undertake such a project. Now with the improved copper situation, and firm's expanded concentrator in operation, it has become advisable to reopen this installation. The program has not altered the Las Ventanas smelter program which is slowly continuing.

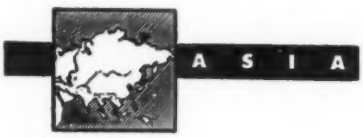
MEXICO–Reportedly, a $15,000,000 aluminum plant is being planned near Temazcal, in the State of Vera Cruz, to be financed with Mexican, German, and U.S. capital. Further information is not now available.

CHILE–A joint Chilean-United States group, headed by Humberto Fariña, has completed exploration of several copper properties in the Vallenar area. Land has been acquired and it is now planned to build a 200-ton copper concentrator. Production will start with cement copper and later will switch to electrolytic copper when the new **ENDESA** power plant goes into operation at the port of Huasco. Senor Fariña was once owner of the **Cia. Minera Punataqui** near Ovalle.

CUBA–**Freeport Sulphur Company** is said to have been investigating a possible copper deposit near Holguin in Oriente Province. This is part of a continuing effort by Freeport to develop new mineral resources in the area around its nickel and cobalt operations.

BOLIVIA–Heavy rains hampered deeper drilling of the placer gold properties held by **Bol-Inca Mining Corporation** on the Mapiri and Kaka rivers last season. A number of test holes drilled in two separate parts of the concession area had shown interesting results, so a larger rig was moved in. This work is being resumed now; **Natomas Company** of San Francisco, California holds a controlling interest.

CHILE–President Jorge Alessandri has reported that his country is negotiating for new copper smelters to increase Chilean copper production. The long-term goal is copper exports worth $200,000,000 annually.



KOREA–The **Central Soil and Mineral Laboratory** has decided to revise its contract with the **Aero Service Corporation** of Philadelphia. The latter had been undertaking a 10,000-square-mile geophysical survey of South Korea and had completed the first phase. The contract is now to be extended to cover a fifteen-month period instead of nine, and the flying distance of the survey place, the "Apache", will be extended to 21,000 miles. If terms of the revised contract are approved, the project will continue until the end of January 1960.

INTERNATIONAL

THAILAND — A barter arrangement covering 2,000 tons of tin metal from Thailand in exchange for surplus United States tobacco has been accepted by both countries. The International Tin Council is said to have agreed to the transfer of ex-quota tin, and the amount is not to be debited against the permissible export quotas for Thailand. This is reported to be the first transaction involving tobacco for tin. It probably will not occur again because Thailand is a dollar purchaser of tobacco and it is against United States policy to replace dollar sales with barter-transactions. The ore will be shipped to the Texas City, Texas smelter operated by **Wah Chang Corporation**, and converted into Grade A metal for the United States stockpile.

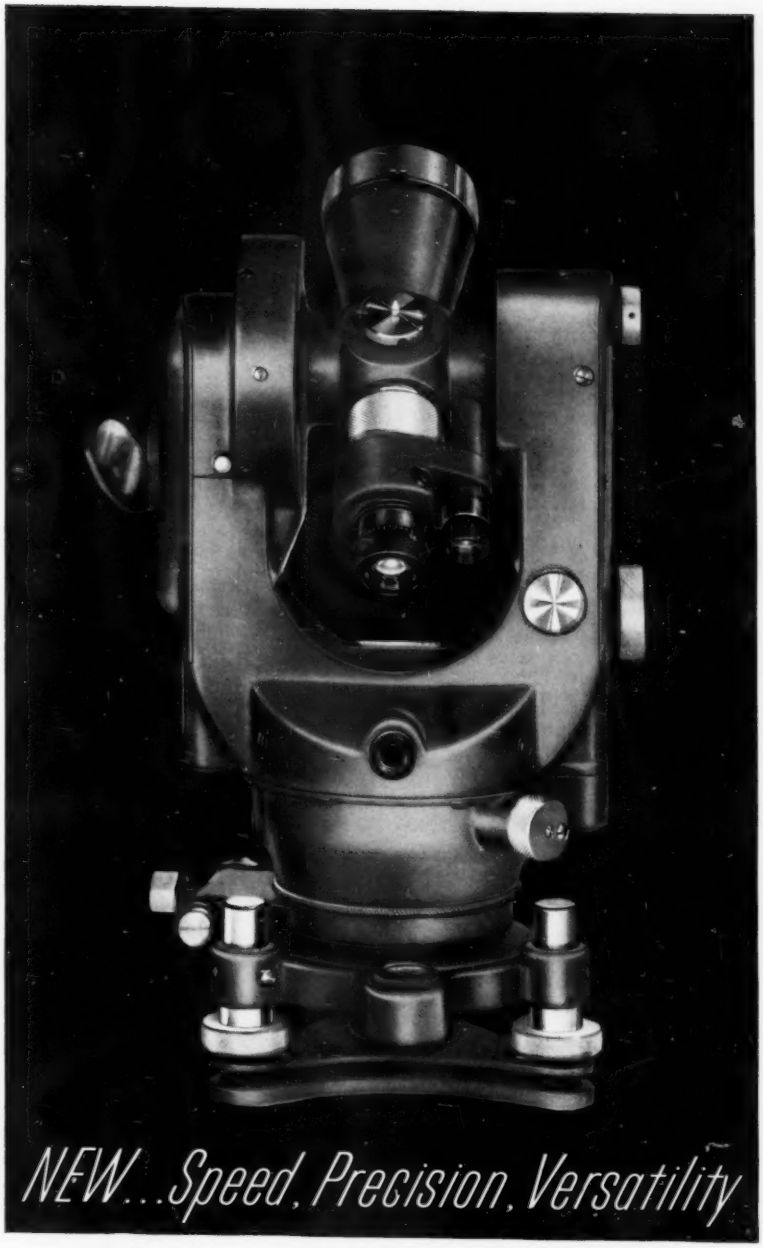
MALAYA — **Anglo-Oriental (Malaya) Ltd.** has almost completed reconstruction of the 15-cubic-foot ocean-going dredge which will be used to dredge tin-bearing areas off the coast of Bhuket Island. The output of tin from mines operated by Anglo-Oriental in Thailand during the last fiscal year ended March 31 was 781 tons. Permitted exports for this group totaled 730 tons. At the end of the year, two dredges were idle because of the quota control.

TURKEY—The first airborne geophysical survey ever undertaken in Turkey is being performed by **Canadian Aero Service Ltd.** at the request of the **Turkish Gulf Oil Company.** Base for the survey is Ankara, and the work is being conducted over the Tuz Golu and Thrace areas. The magnetic data, when compiled into map form, is expected to be useful in further ground studies and exploration.

MALAYA—Only two of the four dredges operated by **Sungei Besi Mines Ltd.** worked throughout the last fiscal year (to March 31) and one of these has since shut down. The dredge at **Pelepah** has also been closed down and its quota is being handled by the Sunset Besi section. The Pelepah dredge, however, has been overhauled and can resume operation at any time. Also, a modern treatment plant is being installed which should be ready very shortly. Because of its financial stability, the firm is carrying its permitted stocks of tin concentrates above the export quota.

CEYLON—The **Ministry of Industries** is taking steps to provide the **Department of Mineralogy** with additional equipment needed to expand and expedite the present program of mineral exploration in order to obtain an accurate assessment of the country's raw materials resources. The Mineralogy Department has two diamond drills which it received from the American Aid Program and these are to be used almost exclusively for the next two and a half years to investigate subsurface iron ore deposits on the island. Two additional drills are needed to investigate radioactive mineral occurrences.

MALAYA—**Tekka Ltd.** has decided to suspend operations temporarily because of its assessment under the Tin Control Regulations which has permitted the company to sell only 45 percent of its average output figure based on the years 1953 to 1957. Under these conditions, tin ore production has not been profitable and the situation will not be materially altered by the recent increase in output quotas. The company's stocks will be used to fill the sales quota in the next few months. After this, arrangements will be made in the Cornish-Malayan



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group for the production of Tekka's tin ore quota on a profit-sharing basis and this will provide Tekka with sufficient income to meet the cost of care and maintenance.



FEDERATION OF RHODESIA & NYASALAND—**Chibuluma Mines Ltd.** is proceeding with development for production of the Chibuluma West ore body which has now been established to contain 2,000,000 tons assaying 4.81 percent copper. This work will be done concurrently with mining the main ore body. Development work is estimated to cost £850,000. Production is scheduled to begin in 1963. The total tonnage can be treated in the existing concentrator at Chibuluma and will mean an increase in production of 4,000 long tons of copper per year.

BECHUANALAND — Participating in the prospecting agreement of the **Rhodesian Selection Trust** group with the Bamangwato tribe for prospecting rights over 40,000 square miles of tribal territory are **Mond Nickel Exploration Ltd.** of Canada and **Minerals Separation Ltd.** of London. The rights extend for 10 years on a royalty basis. A greater part of the area has never been scientifically explored for minerals. The main railway from Bulawayo in Southern Rhodesia to Mafeking, the Union of South Africa's border town, travels through this concession area for some 200 miles.

SIERRA LEONE — A new five-year agreement for marketing of diamonds goes into effect this month. The **Diamond Corporation** and the Sierre Leone government have concluded a new agreement; the first one was signed in 1956. This is another attempt to control extensive smuggling. This time African miners will be dealing with a selling organization established by their own government and containing its representatives. Three of these government appointments and two representing the corporation will form an executive board which will supervise a Government Diamond Office managed by the Diamond Corporation. All production under the Alluvial Diamond Mining Ordinance will be marketed through the Office, an arrangement which is expected to bestow greater stability on the industry in the territory, and diamond marketing generally. If dissatisfied with prices offered by the Sierre Leone office, a producer may have output shipped directly to London for sale there via the **De Beers Central Selling Organization.**

SOUTH WEST AFRICA—The **South African Iron & Steel Industrial Corporation** has acquired the **Uis** tin mine of **Uis Tin Mining Company (SWA) Ltd.** in the Brandberg area. The new owners reportedly plan to spend £50,000 on further exploration. At present, **Industrial Minerals Exploration (Pty.) Ltd.**, a subsidiary of ISCOR, is reconditioning the plant and machinery.

FEDERATION OF RHODESIA & NYASALAND — Present known ore reserves at **Nchanga Consolidated Copper Mines Ltd.**'s property in Northern Rhodesia total 162,000,000 tons with an average grade of 4.75 percent copper. The property the firm holds extends 72 miles. In this area, only three localities are presently being mined, and at least two other deposits, potentially as rich as those being mined, are known to exist. If prospecting were to cease immediately, Nchanga has enough ore reserves to continue producing at present rate of output for another 40 years.

BASUTOLAND — **De Beers Consolidated Mines Ltd.** has acquired an unspecified interest in the diamond concession held by Jack Scott in Basutoland. Over the past three years, extensive prospecting has been conducted, and a number of kimberlite occurrences, some diamondiferous, have been located and investigated. Under the agreement, Mr. Scott will continue to direct the prospecting work which will continue, but now the advice and services of De Beers' research organization will be available to him. The agreement provides that the sales of any diamonds eventually produced be made through the **Central Selling Organization.**

GHANA—A value of nearly 4.0 ounces of gold per ton has been obtained on the 39th level North of **Ashanti Goldfields Corporation Ltd.** This is in keeping with exceptionally good development, as well as production, results being obtained. During the eight-month period of October 1958 to May 1959 a profit of £1,051,191 (before tax) was made, compared with only £840,972 in the same period of the previous year.

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INTERNATIONAL

LIBERIA—The **Columbia Southern Liberian Corporation,** a subsidiary of **Columbia-Southern Chemical Corporation** in the United States, has been granted a concession to mine columbite-tantalite, rutile, and accessory minerals. Extensive exploratory work is now underway.

FEDERATION OF RHODESIA & NYASALAND—The **Geological Survey of Northern Rhodesia** reports the presence of sizeable metallic sulphide deposits and graphite deposits in the Petauke area of eastern Northern Rhodesia.

UNION OF SOUTH AFRICA—**Western Deep Levels Ltd.** has arranged with its northern neighbor, the **West Driefontein** mine, for the sinking of a winze from the latter's No. 5 shaft workings down-dip on reef on the Ventersdorp Contact horizon. After this winze has crossed the common boundary, a reef drive westward on strike will be advanced within the Western Deep Levels lease area. This will facilitate an earlier disclosure of values from the Ventersdorp Contact Reef.

NIGERIA—**Tin and Associated Minerals,** in which **Kennecott Copper Corporation** holds a 52 percent interest, has resumed production of columbite because of an improved demand for the mineral on the world market. Primarily, a large U.S. steel company has started to use ferro-columbium in production of new low-alloy steels. The development of columbium base alloys for high temperature applications is also expected to lead to greater columbite consumption.

UNION OF SOUTH AFRICA—**Welkom Gold Mining Company** has commissioned the main ventilation fans in the Joint No. 3 shaft system in the southwest section of the lease area. Development in country rock has been initiated from the main component of the system. Deepening of the No. 1 shaft has been completed and work on the No. 2 shaft is still in progress.



OCEANIA

QUEENSLAND—During the second half of this year, **Mount Isa Mines Ltd.** will send an additional £2,500,000 worth of copper concentrates to Japan. The company is currently supplying 18,000 tons of copper concentrates to Japan at a rate of 1,500 tons monthly. These export shipments represent the difference between the mine's copper production capacity and the smelter's reduction capacity at the present time. Smelter capacity is being increased. Mt Isa's refining subsidiary, **Copper Refineries Pty. Ltd,** at Townsville, has started operations from its first casting furnace.

NEW GUINEA—**Australian Gold Development** and **King Island Scheelite** intend to develop jointly gold-bearing areas at Kainantu, New Guinea which are held under option by the former company. King Island will spend £10,000 over 12 months in prospecting by drilling and sampling. If King Island is satisfied after sampling, it will spend an additional £25,000 before April 30, 1961. Then if results warrant, a new public operating company will be formed to take over these areas. Initial testing is to obtain a reliable estimate of the average gold content and dimensions of the accessible part of the Mount Victor ore body.

REPUBLIC OF THE PHILIPPINES—Later this month, **Ferrum Mining and Development Company** expects to start shipping laterite ore to Japan. Negotiations are also under way in Hong Kong for export of the ore to Germany. The firm's mining property is on Homonhon Island, off the coast of Leyte where the firm discovered substantial nickel-iron reserves after extensive exploration and development work. According to Fred Friedrich Maack, general manager, this is the first time a Filipino firm has sent laterite ores abroad. Approval of the Monetary Board and the National Economic Council is necessary.

INDONESIA—It has been reported that the Indonesian government plans to erect a tin smelter on Banka Island, but few details on the project are available. The plant would have a 25,000-ton annual capacity, and an electric power plant is said to have already been built to supply power for the smelter. Calls for bids reportedly have been sent to the United States, West Germany, Japan, and Soviet Russia. The **Mitsubishi Metal Mining Company** of Tokyo is said to have submitted a proposal covering 1,000,000,000 yen in machinery.

NEW GUINEA—**Enterprise of New Guinea Gold and Petroleum N.L.** reports

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that it is driving on lode material 30 inches wide averaging 1.0 ounce per ton. To date, only alluvial gold has been satisfactory in New Guinea but there are undoubtedly possibilities there for reef gold and other mineral deposits.

NEW ZEALAND—The **Gold Mines of New Zealand** west coast dredges are showing good returns of bullion. The Arahura dredge of **Arahura Gold Dredging Ltd.** produced 962 ounces from 253,000 cubic yards in April and 1,650 ounces from 220,000 cubic yards in May. The dredge of **Kanieri Gold Dredging Ltd.** at Taramakau produced 894 ounces from 364,000 cubic yards in April and 1,340 ounces from 421,000 yards in May. For the last two years, Arahura's production has been poor because of hard, low-grade ground, but Kanieri has shown some very high yardages, averaging slightly over 1,000 ounces per month. Arahura area will be exhausted in two or three years but, even under present price-cost conditions, Kanieri is likely to continue for 8 to 10 years.

REPUBLIC OF THE PHILIPPINES—The **Bureau of Mines** is seeking $502,625 in aid from the **United Nations Special Fund** for geophysical and geochemical surveys in the Philippines. According to the Director of the Bureau of Mines, Benjamin M. Gozon, very little of the Philippines has been surveyed since 1895, and only 20 percent of the country has been covered by a reconnaissance and detailed geologic mapping. Included in the project would be a general reconnaissance geologic mapping, supplemented by photo geologic studies, and the establishment of a coal testing laboratory and pilot plant. The Philippines would contribute Pesos 253,800. Results would be available to private companies.

HAWAII—The **U.S. Bureau of Mines** has renewed its investigation of bauxite deposits in Hawaii. Plans call for collecting eight samples, weighing about 200 pounds each. These will be sent to the Bureau's laboratories at Rolla, Missouri for metallurgical treatment.

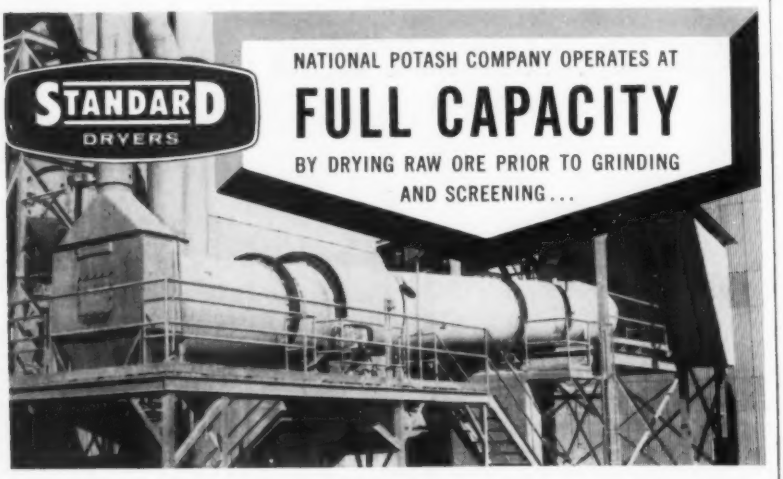
REPUBLIC OF THE PHILIPPINES—**Samar Mining Company** has made good headway with construction of its 42-kilometer road from the pier site to the mine site and it is about completed. Road surfacing will take longer. A new mineralized ore known as **Esperanza** has been discovered at the Sibuguey project, and is now being evaluated.

NORTHERN TERRITORY — Production of U_3O_8 is now on a continual basis at the Northern Hercules mill of **United Uranium N.L.** at South Alligator River. About £450,000 worth of concentrate is expected to be shipped this year, and £900,000 worth per year thereafter until completion of the present contract about 1965. Construction of **South Alligator Uranium's** 15-ton-per-day mill is proceeding on schedule and production should be underway by the end of the year. United Uranium now reports a reserve of 125,508 tons of ore averaging 7.753 pounds of oxide per ton.

REPUBLIC OF THE PHILIPPINES—**Acoje Mining Company** is currently studying the possibility of establishing a ferro-chrome plant in order to improve the company's stability.

TASMANIA—The **Savage River** iron ore deposits are now believed to be larger than indicated by earlier drilling. 100,000,000 tons had been believed to be in the deposit, but the present objective of a five-year survey is to prove 200,000,000 tons.

REPUBLIC OF THE PHILIPPINES—**Benguet Consolidated Inc.** has acquired a purchase option on 138 copper and gold claims owned by **Kennon Road Copper Mines Inc.** around Camp 4 along the Kennon Road near Baguio. The firm has until September 30, 1960 to explore the area and decide whether to buy it. Purchase price is set at Pesos 2,000,000.



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EUROPE

EIRE—Capacity of **St. Patrick's Copper Mines Ltd.**'s differential flotation plant will be increased from 4,000 to 7,500 tons of ore daily. A chalcopyrite flotation concentrate is shipped overseas for smelting. Eire's largest mine, **St. Patrick's** is located at Avoca in County Wicklow and is a subsidiary of **Mogul Mining Corporation.** During the last several years, about 20,000,000 tons of ore assaying from 0.95 to 1.36 percent copper have been developed at the mine, which uses under-

ground trackless mining with Diesel powered equipment.

YUGOSLAVIA—A lead-zinc mine is being developed at Mojkovac in Montenegro, with ore reserves estimated at over 3,000,000 tons. A new mine near Pristina, southern Serbia, is developing ore containing gold, silver, pyrite, and bismuth.

EIRE—Diamond drilling over the past six months at the Gortshaneroe section of **Silvermines Lead and Zinc Company, Ltd.** of Shallee, County Tipperary, has proved 350,000 long tons of barite. Drilling is still in progress, with an additional 350,000 long tons indicated. A gravimetric survey is also being made in an attempt to determine the extent of the deposit, which occurs as a replacement of a dolomitic limestone bed.

UNITED KINGDOM—Plans for the commercial production of nuclear-grade beryllium metal are being put into effect by the **Imperial Chemical Company** Great Britain's largest chemical combine. For a number of years the firm has been investigating, under contract with the **Atomic Energy Authority**, a thermal reduction method. This work has now been successfully concluded and beryllium metal of the highest purity has been produced. A new plant is being installed at Avonmouth, and the first stage will be in operation by the end of 1959. A second stage will involve considerable expansion and the company will gear the rate of production to the demand created in connection with the development of gas-cooled reactors.

PORTUGAL—Tin mining operations were continued by **Portuguese-American Tin Division** of **Yuba Consolidated Industries Inc.** on its property near Belmonte during 1958. The company is also drilling in Portugal to extend its area of operation.

AUSTRIA—The **Ranshofen Aluminum Works** is planning an expansion of its **Unterlaussa** bauxite mine this year to meet increased demand for aluminum. The mine's output in 1958 was 23,600 tons, an increase of 1,500 tons over the previous year. Austria produces about 50,000 to 60,000 tons of aluminum annually from 220,000 tons of bauxite. Since she does not produce enough bauxite, alumina imports run about 100,000 tons a year. Most of this comes from West Germany.

SPAIN—In Aldea-Moret, province of Carceres, **Arisa** has started to recover by-product copper from pyrite roasting. The firm obtains the calcine from **Explosives S.A.** In the same province, ambligonite (lithium ore) is being mined with an 8 percent content. Iron ore output in the province has decreased because of the high transportation costs. (All Caceres ores have to be shipped through the port of Huelva or through Portugal.)

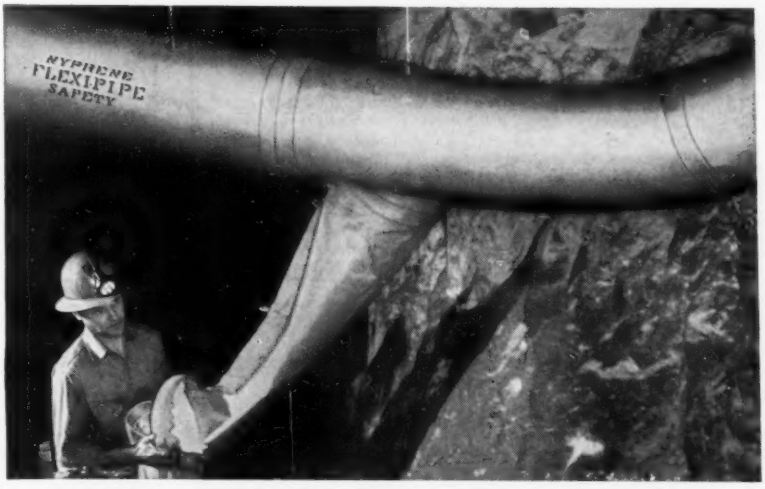
NORWAY—Iron concentrate production by **A/S Sydvaranger,** Norway's largest producer, totaled nearly 1,200,000 tons in 1958. This was an increase of about 100,000 tons over the previous year and set a new record. Sales totaled 1,100,000 tons valued at about 95,000,000 kronor. West Germany took the largest amount—498,000 tons; the United Kingdom received 273,000 tons and the state-owned steel company, **Norsk Jernverk,** received 192,000 tons. Output for 1959 is expected to total about 1,100,000 tons, and all of this reportedly has already been sold, but at considerably lower prices. The same groups will receive this year's production.



BRITISH COLUMBIA—A vein of high-grade gold ore has been found beyond a fault in the old **Camp McKinney** property and **Giant Mascot Mines** has optioned the claims with immediate development planned. The ore was found in drilling by W. E. McArthur Sr. of Greenwood. Old underground workings subsequently were reclaimed and drifting started. Prior to 1903, the mine yielded $3,500,000 worth of gold ore. Giant Mascot has also purchased a 51 percent interest in **Western Nickel Ltd.;** the remaining 49 percent is held by **Pacific Nickel Mines.** A new company called **Giant Nickel Mines** has been formed and it is now operating the mine at Choate, B.C., in the Fraser Valley.

ONTARIO—**Steep Rock Iron Mines Ltd.** has scheduled shipment of 2,000,000 tons of ore in 1959. Operations started at the Hogarth No. 2 plant and the South Concentrator in May, and the North Concentrator began in June. The latter is new this year and will beneficiate ores from the **Hogarth** open pit. The South

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ONTARIO—Shaft sinking is underway at the nickel property of **Fatima Mining Company** in the Timmins area of northern Ontario. **Dravo Corporation** of Canada has the contract for the three-compartment shaft which will be 790 feet deep. About 1,600 feet of lateral work is planned on the 450- and 750-foot levels with 1,000 feet of raising. Another 10,000 feet of underground drilling is also included in the development program.

BRITISH COLUMBIA—**Nimpkish Iron Mines**, a subsidiary of **Standard Slag Company**, will ship 1,000,000 tons of iron ore to Japan from its property on northern Vancouver Island starting this summer. About $2,000,000 is being spent on development of the mine, and for erection of the crushing, screening, and concentrating equipment.

ONTARIO—**Northspan Uranium Mines**, operating the **Lacnor** and **Panel** uranium mines in the Elliot Lake district, is making steady progress in improving operations. The deep development program at the Panel is about finished and is expected to make the mine much more efficient. One new feature is a larger ore moving system which will be able to handle 5,000 tons daily instead of the present 4,000. Mill heads are now running higher, by about 2.16 pounds per ton. Both mines are gradually changing over to conventional mining methods from the trackless methods.

QUEBEC—Present ore reserves for **New Hosco Mines** on its property in the Mattagami district now total 1,665,000 tons averaging 2.57 percent copper. Included is 1,200,000 tons averaging about 3.0 percent copper. Parallel to the copper zone is a zinc structure estimated to contain 780,000 tons averaging 8.15 percent zinc. Diamond drilling is still continuing.

BRITISH COLUMBIA—Mining and milling operations have been resumed near Greenwood by **Consolidated Woodgreen Mines.** Mining is by open-pit methods. About 30,000 tons of copper ore was broken down in blasting a pillar of ore which supported old underground workings. Milling began at a rate of 500 tons

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INTERNATIONAL

a day and will be stepped up to 1,000 tons. C. W. S. Tremaine is mine manager.

QUEBEC — The Quebec government has granted a three-year mineral exploration license to **Murray Mining Corporation** covering an asbestos showing in the Deception Bay area. The find was first located through aerial reconnaissance, and then confirmed through surface prospecting and magnetometer survey. Two anomalies will be further drilled this summer. A camp will be set up, and a further geological and magnetometer survey of the entire area will be made.

ONTARIO—**Castlebar Silver & Cobalt Mines Ltd.** has started exploration, diamond drilling, and surface work on its 28 claims in the Gowganda silver camp of northern Ontario. The current program will cover an initial 4,800 feet of diamond drilling, along with the surface exploration work which will include detailed geological mapping of part of the property. Work is under the direction of **International Mine Services Ltd.**

NORTHWEST TERRITORIES — **Salmita Consolidated** has resumed developments operations this season on its gold property at Matthews Lake. The firm plans to reopen the No. 1 shaft and continue drifting on the first 125-foot level. Five additional ore-bearing veins were revealed in the north shaft area, according to company officials.

ONTARIO — The assets of **Initiative Mining Company Ltd.** and **Pendragon Corporation Ltd.** will be sold to a new company to be known as **Penelope Explorations Ltd.** The merger is expected to enable both companies to have wider participation in mining exploration and development. President of Penelope will be Stephen Kay. Field activities will be handled by **International Mine Services Ltd.**

QUEBEC—**Weedon Pyrite and Copper Corporation** is continuing shaft sinking at its base metals property in Eastern Townships and expects to open up at least the No. 17 level this year. Actual mining operations on the 16th level have been suspended until the ore potential of the 17th have been examined. If favorable, both levels would then be mined in open operation. The company's name has been changed to **Weedon Mining Corporation.**

BRITISH COLUMBIA—Encouraging indications of a possible extension of the **Taiga Mines'** germanium deposit in the Powell Creek area have led the firm to continue drilling. The original discovery was made along Lang Creek and this is being investigated further. Work is also being done along Kelly Creek. The churn drilling is being done by **Pacific Water Wells Ltd.** under contract.

NORTHWEST TERRITORIES—The new firm in which **North Rankin Nickel Mines Ltd.** will participate (see MINING WORLD, March 1959, page 88) has been named **Arctic Explorations.** It includes individuals associated with **Consolidated Mogul** and affiliated companies. **Canadian Aero Service** and the **Hunting** organization are mapping the area from the air, and ground parties will follow up later in the season. North Rankin has a 10 percent undivided interest in the firm. It will provide a base for operations, and use of its equipment and technical personnel. The property is at Rankin Inlet 320 miles north of Churchill, Manitoba.

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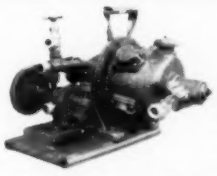
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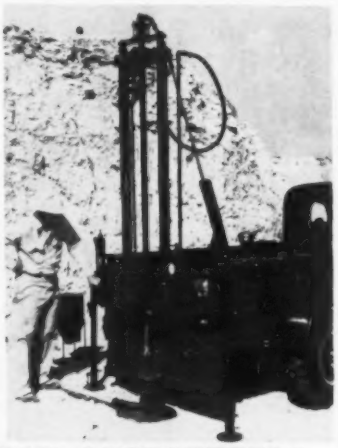
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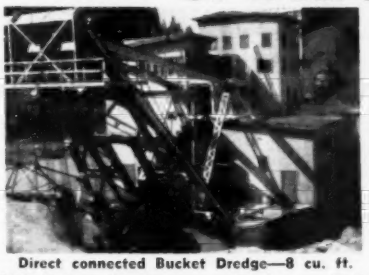
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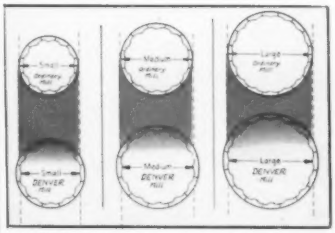
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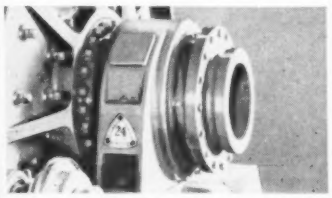
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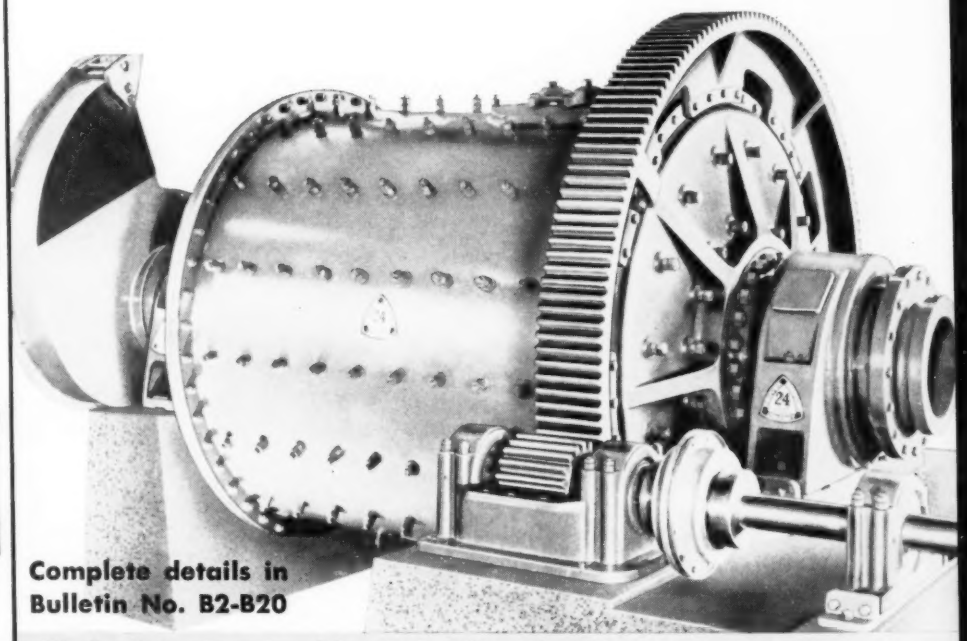
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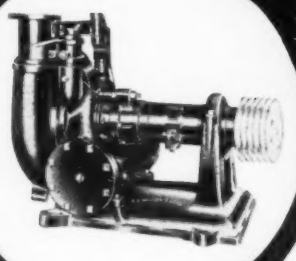
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